

April 1945

TECHNOLOGY REVIEW

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technology review

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FORGED IN!

FOR STRENGTH...
AIRCRAFT HAVE THEIR
"V" FOR VICTORY

THE

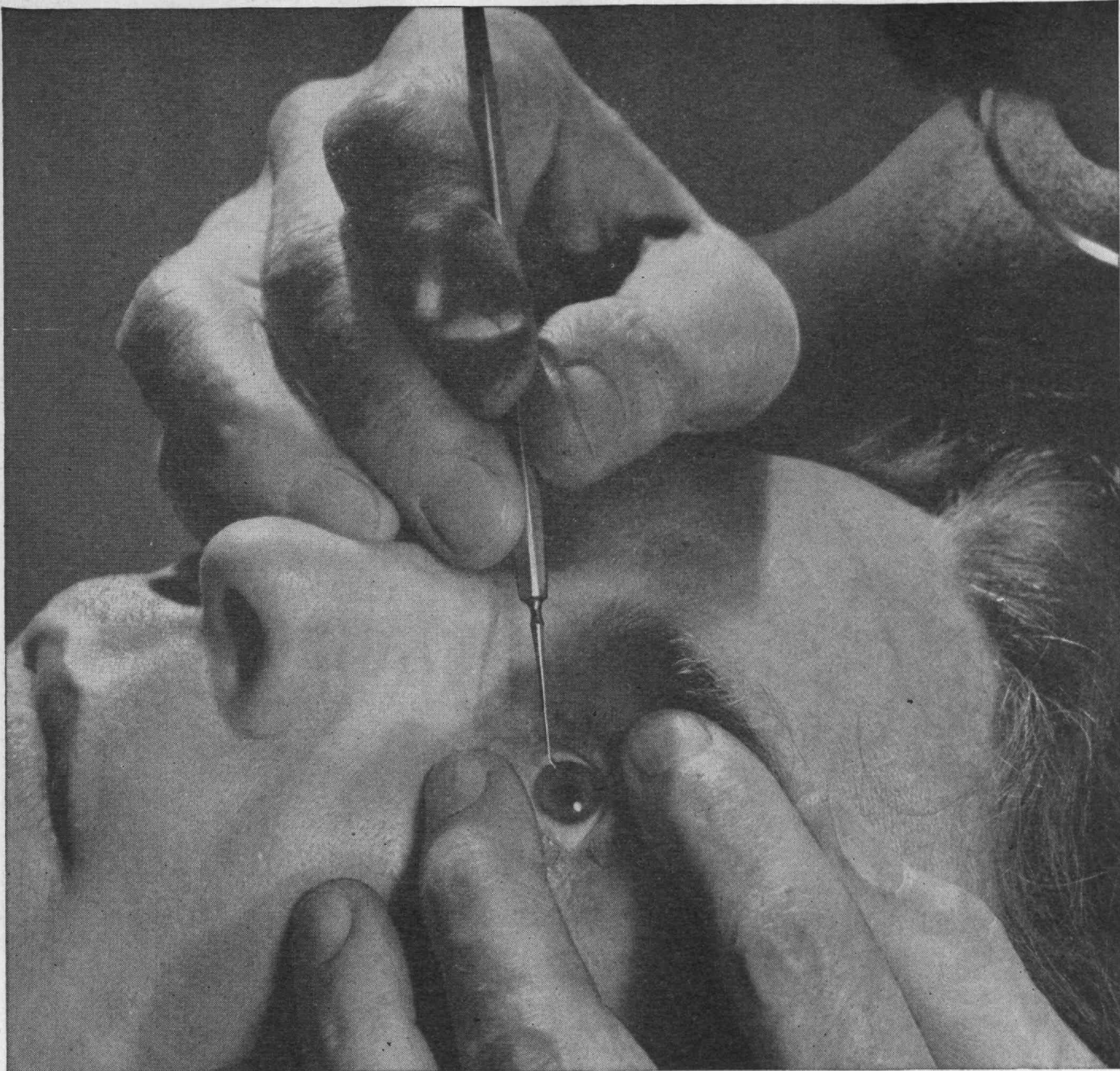
HARVEY

METAL CORPORATION

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Minor Eye Accidents Are A Major Cost

For every "lost eye" accident, there are approximately 300 "minor" eye injuries. What these "minors" cost in hours...in lost production...seldom appears in company records...yet, the totals far exceed those of the claim cases.

Ninety-eight per cent of these eye accidents are

preventable. Scientifically designed AO Safety Goggles will protect workers against practically *all* industrial eye injuries. For greater efficiency, bigger production, lower costs, take advantage of an AO Safety Representative's experience. Call the nearest American

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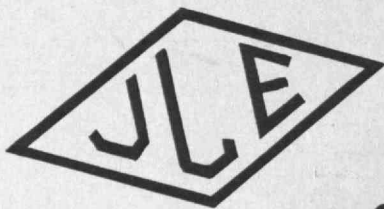
COMPANY

SOUTHBRIDGE, MASSACHUSETTS

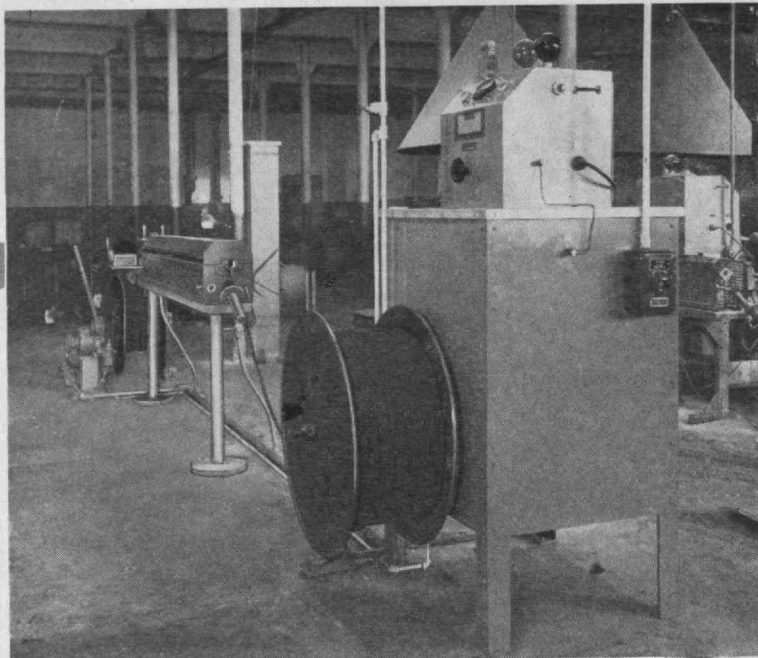
Automatic Reeling, Measuring and Spark-Testing Equipment Installed at Anaconda Wire & Cable Co. at Pawtucket, Rhode Island

ANACONDA

SELECTS



SPARK-TESTING EQUIPMENT



AND USES  PROPOSED STANDARDS
FOR SPARK-TESTING THEIR INSULATED WIRE AND CABLE

The James L. Entwistle Co. has paced the spark-testing field for more than 26 years — has, in fact, developed every improvement in spark-testing equipment which has taken place over that period.

Today, only Entwistle high-speed, high-sensitivity wire sparkers are guaranteed to meet Navy 15-Ci (INT.) specifications, British and Canadian specifications and all present or future specifications of the Underwriters' Laboratories for the Spark-Testing of Insulated Wire.

SEND FOR THE PROPOSED  SPARK-TESTING STANDARDS

The Entwistle Proposed Standards for Spark-Testing are being used more and more where production spark-testing of insulation is specified in place of, or allowed as an alternate to the water test. These proposed standards outline the points in the manufacturing process where spark-testing should be used, give length of electrode for various wire speeds, recommend test voltages for various compounds and insulation thickness. A copy of the proposed standards will gladly be forwarded upon request.

JAMES L. ENTWISTLE CO.

43 CHURCH ST., PAWTUCKET, R. I.

WORLD'S LEADING MANUFACTURER OF SPARK-TESTING EQUIPMENT

Precision plus Production

Another New NORTON GRINDER —

It's the Norton 4" Type C—a grinder that gives extreme accuracy, high production and convenience of setup and operation on a wide variety of small revolving parts used in instruments and mechanisms of modern high speed machinery and appliances. Electronic control of headstock permits speeds from 100 to 1000 r.p.m. This fast, accurate, convenient Norton Grinder is engineered to meet the production requirements of many cylindrical grinding jobs on small work.

NORTON COMPANY, Worcester 6, Mass.

Behr-Manning, Troy, N. Y., is a Norton Division

*Particularly
suited to grind—*

HEATING EQUIPMENT PARTS

GUN PARTS

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INSTRUMENT PARTS

REFRIGERATION PARTS

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PUMP PARTS

SMALL MOTOR SHAFTS

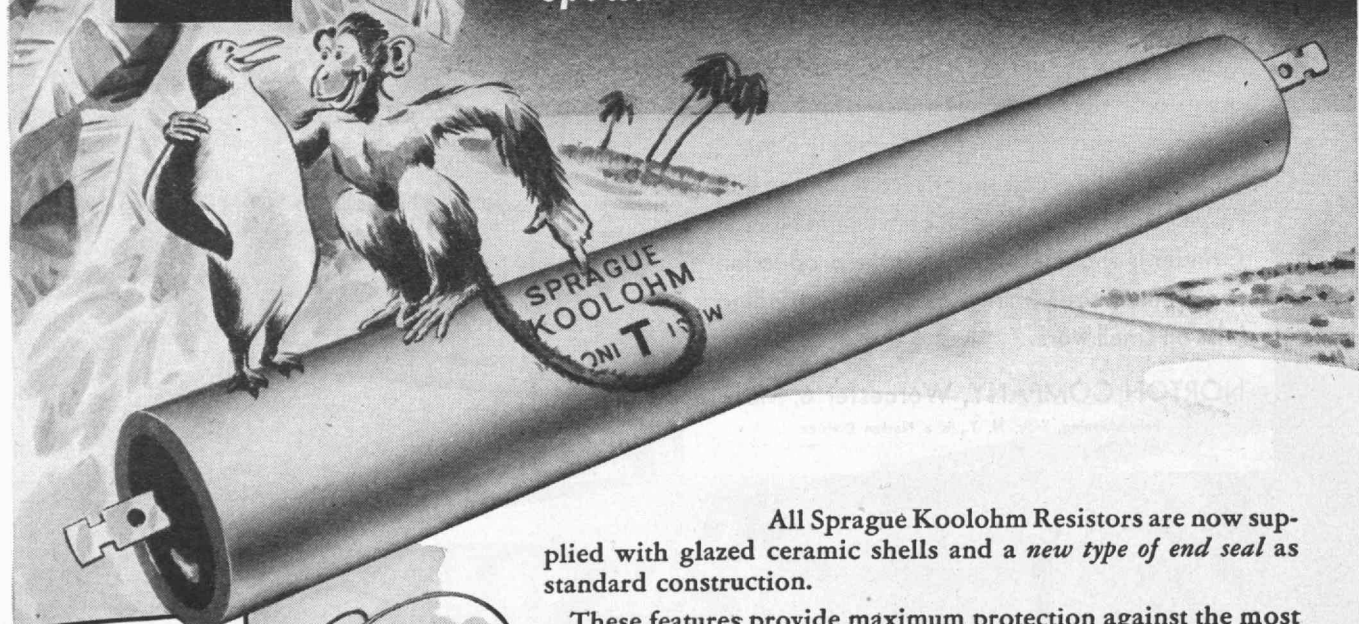
SMALL VALVES



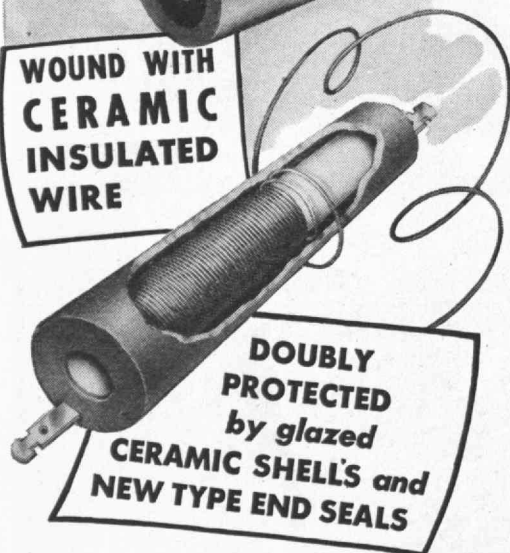
NORTON GRINDERS
and Lappers

T IS FOR "TROPICALIZED"

.... which means that **STANDARD** Sprague Koolohms now have the same **EXTRA HUMIDITY PROTECTION** formerly obtainable only on special order.



**WOUND WITH
CERAMIC
INSULATED
WIRE**



All Sprague Koolohm Resistors are now supplied with glazed ceramic shells and a *new type of end seal* as standard construction.

These features provide maximum protection against the most severe tropical humidity and corrosive conditions. Extensive tests in the laboratories of the armed forces and prime contractors have proven the ability of the "KT" construction to "take it" under the most brutal air thermal shock, humidity, and corrosive conditions.

Type "KT" Koolohms correspond to characteristic "J" of resistor specification JAN-R-26.

All previous catalog designations remain the same except for the addition of the letter "T" to the old type numbers to designate the new standard construction.

Thus "T" is for "Tropicalized"—and all Sprague Koolohms have it. One type of Koolohm, the *standard* type, does the job—under any climatic condition, anywhere in the world.

SPRAGUE ELECTRIC CO., Resistor Division, North Adams, Mass.
(Formerly Sprague Specialties Co.)

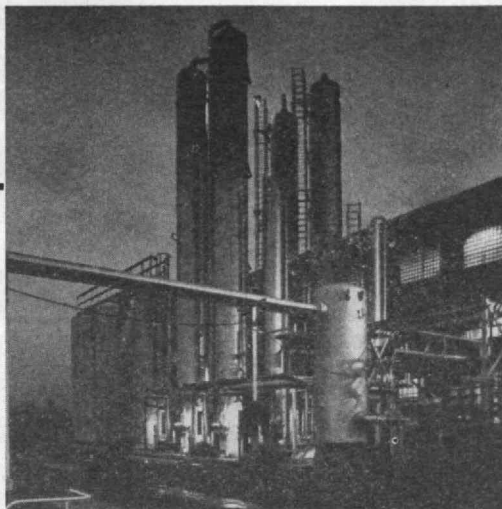


SPRAGUE

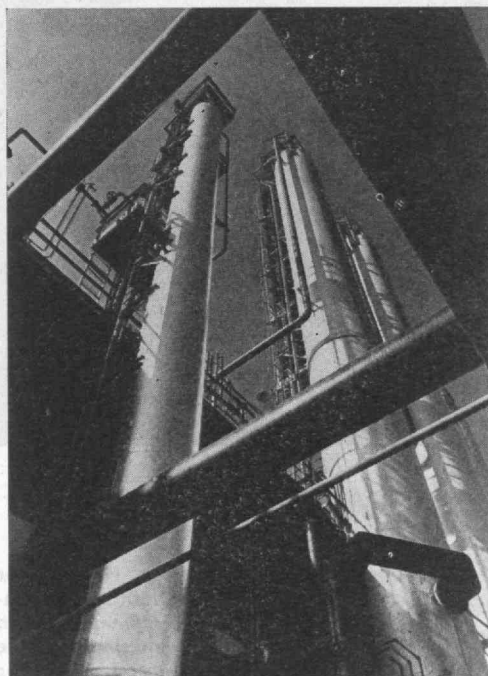
KOOLOHM RESISTORS

COMPLETE CHEMICAL AND PETRO-CHEMICAL PLANTS OR PROCESSING UNITS

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Badger will build what you want



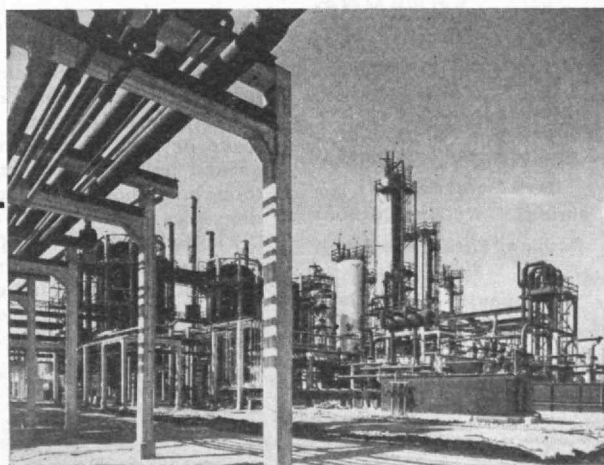
PETROLEUM PROCESSING UNITS

Atmospheric distillation units. Vacuum distillation units. Superfractionators. Thermoform catalytic cracking units. Houdry fixed bed catalytic cracking units. SO_2 solvent refining units. Furfural solvent refining units. MEK dewaxing units. Extractive distillation. Filtrol fractionation. Thermal reformers, crackers, vis-breakers and cokers. And many others.

COMPLETE PETROLEUM REFINERIES

For Gasoline—All facilities, utilities and process units from crude storage and desalting to blending, leading and storage of gasoline.

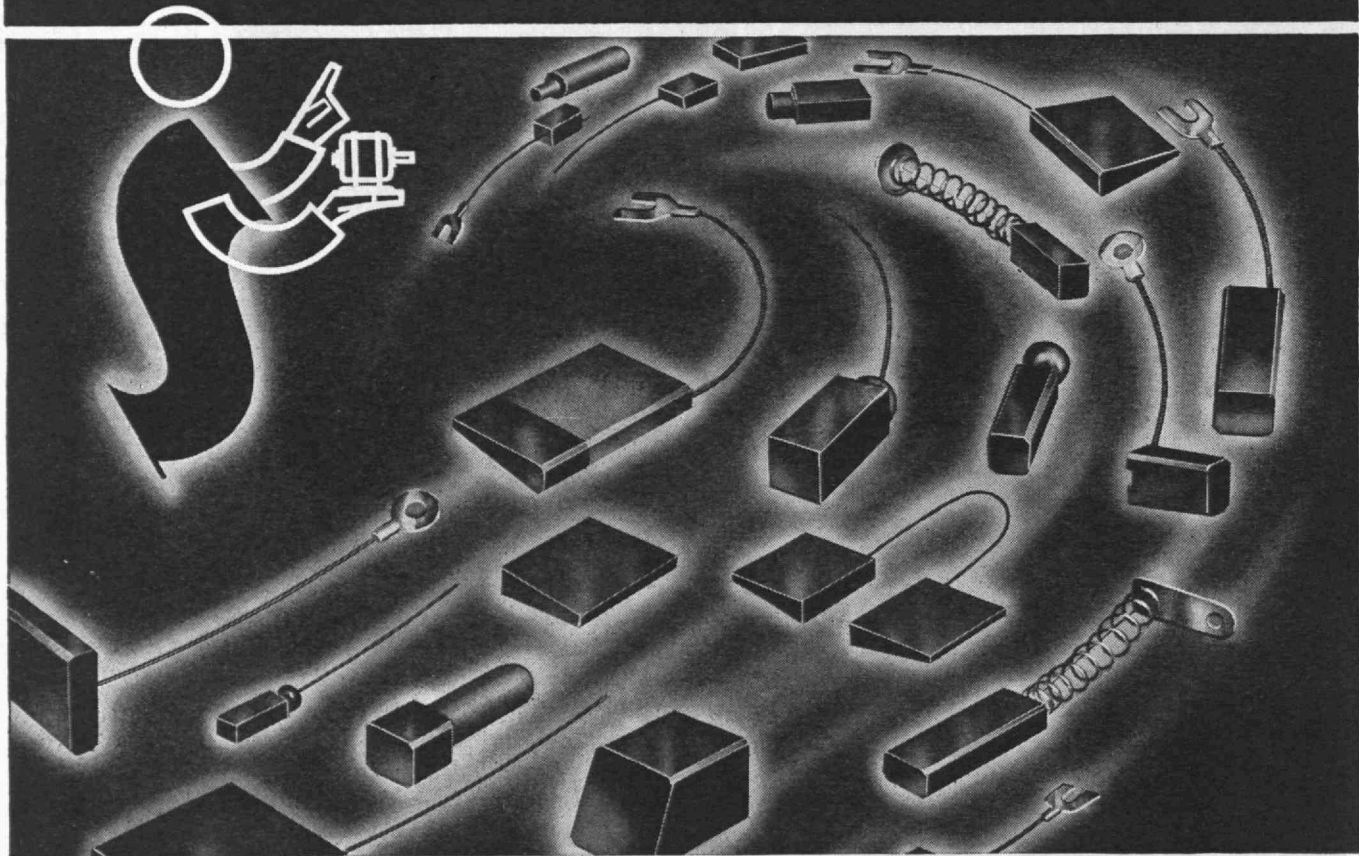
For Lubricating Oils—Vacuum distillation. Solvent extraction and dewaxing. Clay treatment, viscosity blending and additive adding equipment. Packaging plants.



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PROCESS ENGINEERS AND CONSTRUCTORS FOR THE CHEMICAL, PETROLEUM AND PETRO-CHEMICAL INDUSTRIES

EVERY FRACTIONAL HORSEPOWER MOTOR HAS A BRUSH PROBLEM



HEADQUARTERS FOR MOLDED CARBONS, GRAPHITES, METALS, AND COMPOSITIONS

Brushes and Contacts
(All carbon, graphite, metal,
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Rare Metal Contacts
Bearings Welding Carbons
Packing, Piston and Seal
Rings

Continuously Adjustable
Carbon Rheostats
Sintered Iron Components
Fixed and Variable Resistors,
etc., etc.

... and here's why

A fractional horsepower motor brush for use on 110 V. requires an entirely different composition of ingredients than one to be used on a similar motor but, say, for 6 V. operation. Again, a brush that may do very well on one make or type of vacuum cleaner will be regarded as only mediocre on another—even though the points of electrical or mechanical difference are so small as to seem unimportant.

Almost without exception, small motors differ in their brush requirements. Even a slight difference in the "mix" of a brush may—and often does—make a whale of a difference in its life or performance. Emphasis on long life, or

quiet operation, or minimum commutator wear, or various other factors should all be considered—and in the light of the specific application!

Backed with unparalleled experience in the production of more small motor brushes for more applications than any other manufacturer, Stackpole engineers are in an enviable position to help you in this all-important respect. Moreover, for 25 years, it has been their practice to have customers send their equipment to our laboratories. Thus, Stackpole brush recommendations are made NOT by guesswork, but on the sound basis of exhaustive tests on the actual equipment.

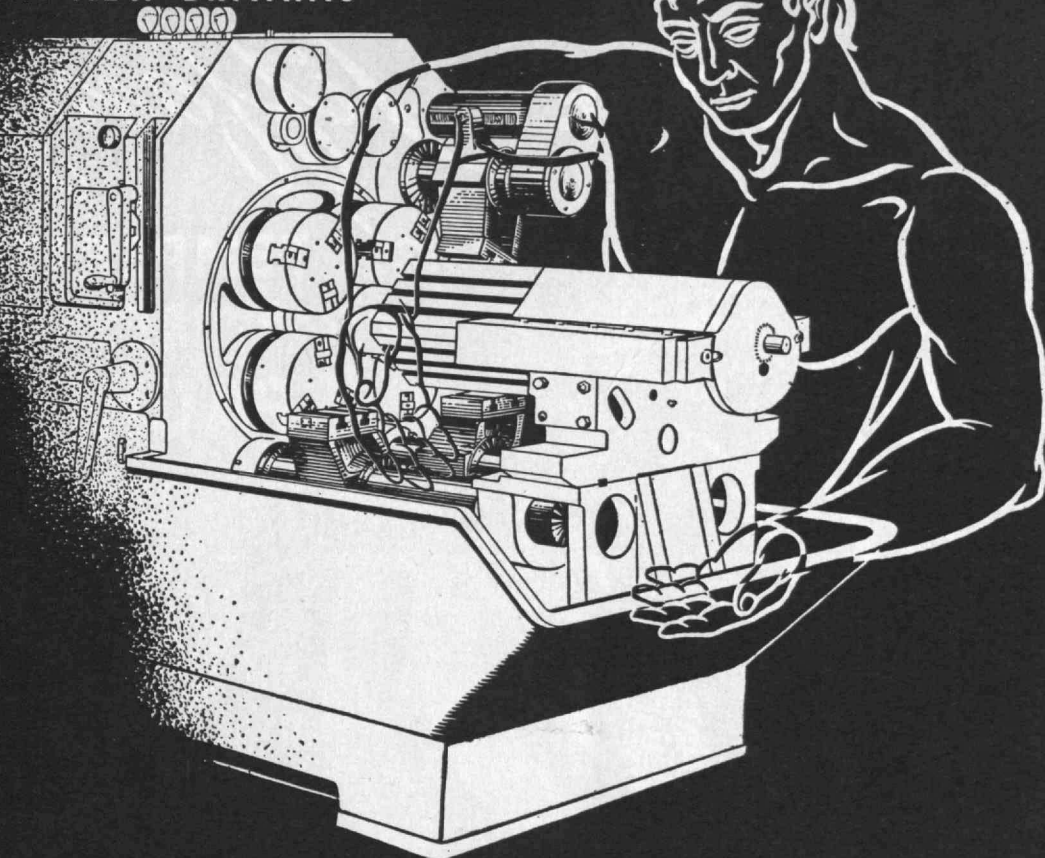
STACKPOLE CARBON COMPANY, St. Marys, Pa.

STACKPOLE

THE NATION'S LARGEST PRODUCER OF SMALL MOTOR BRUSHES

Exclusive

WITH NEW BRITAINS



OPEN END CONSTRUCTION

PROVIDES COMPLETE ACCESSIBILITY

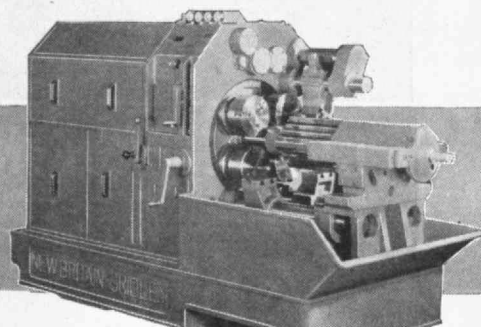
With production demands at their peak today, New Britain Chuckers are delivering the ultimate in consistent and trouble-free performance. The open end exclusive design permits easy accessibility from all sides and above...and allows for convenient chip removal. Every tool attachment and chucking feature is within easy reach for set-up and adjustment...keeping downtime at a minimum. Other time tested features of New Britains assure maximum tool efficiency, accuracy, weave elimination and instant adjustable chucking pressures. Automatically, any postwar problem calls for New Britains...for adaptability, speed, accuracy and economy. Consult the New Britain Sales-Engineer in your vicinity or write direct to the Executive Offices at New Britain, Connecticut.

NEW BRITAINS PRODUCE MORE...BETTER AND FASTER...FOR LESS

NEW BRITAIN

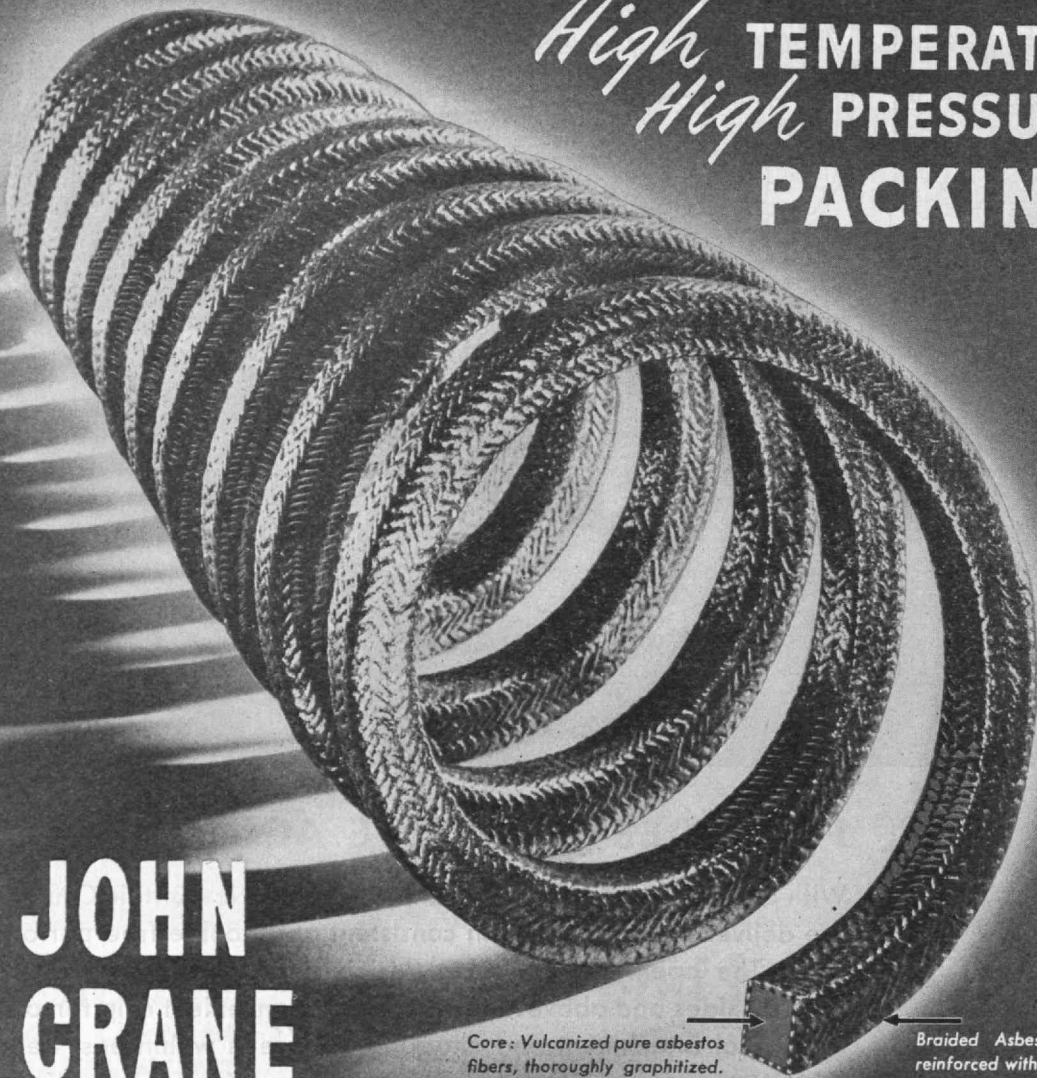
THE NEW BRITAIN MACHINE COMPANY • NEW BRITAIN, CONN.

NEW BRITAIN-GRIDLEY MACHINE DIVISION



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High TEMPERATURE— High PRESSURE PACKING



Core: Vulcanized pure asbestos fibers, thoroughly graphitized.

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CRANE**
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6-AM

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"6-AM installed in open hearth valves. No difficulty."

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"Open hearth valves still packed after 9 months. Exceptional service."

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"Excellent service with steam on stop valves at 2000 p.s.i., 650° F. and superheated 300°. Have standardized on 6-AM."

Operating Engineers: Order spirals, coils, spools, die-formed rings or sets.

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1888 CUYLER AVE. • CHICAGO 13, ILL.

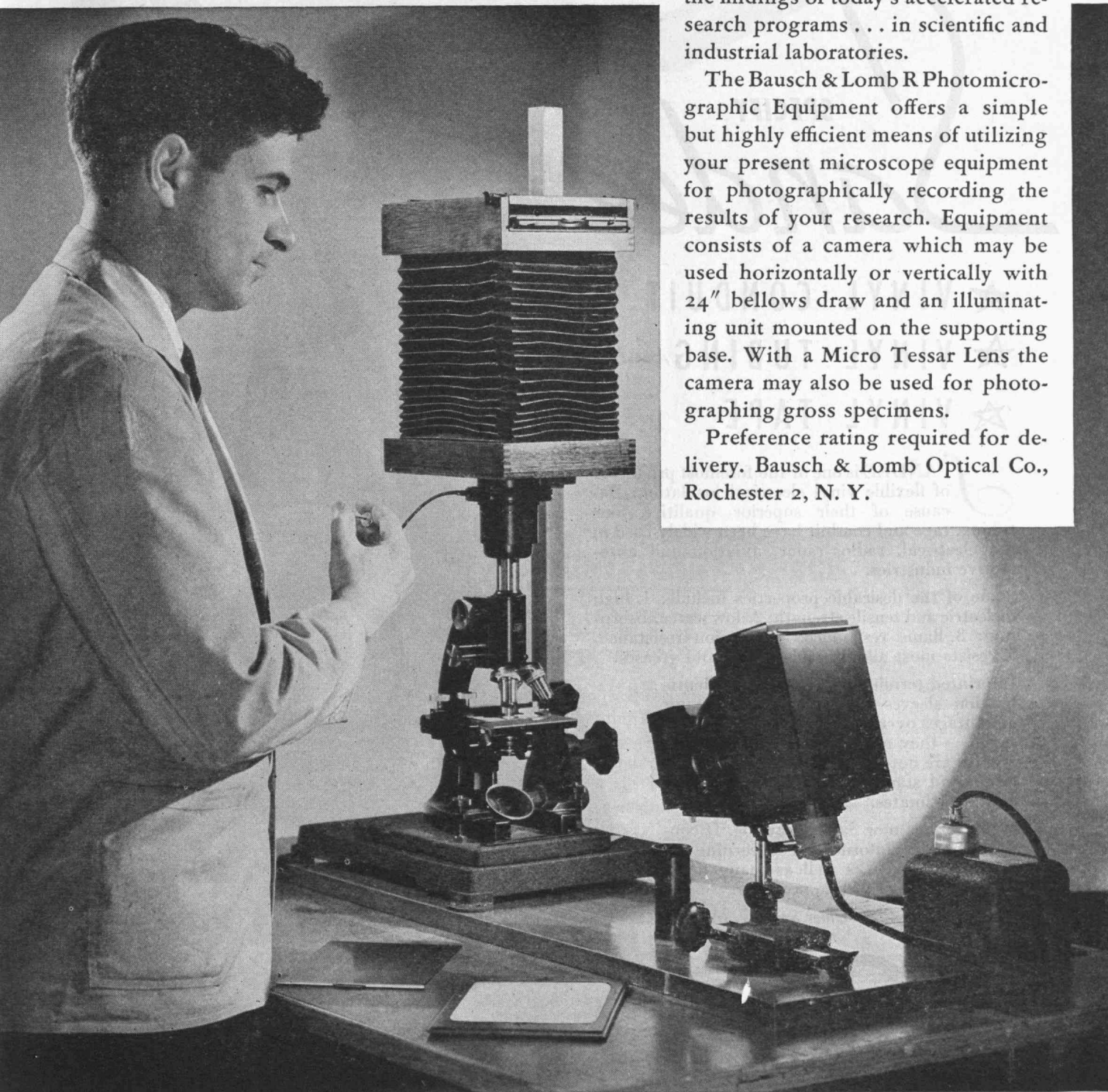
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For a Permanent Record of Your Findings

Bausch & Lomb Photomicrographic Apparatus is playing an important part today in recording for the future the findings of today's accelerated research programs . . . in scientific and industrial laboratories.

The Bausch & Lomb R Photomicrographic Equipment offers a simple but highly efficient means of utilizing your present microscope equipment for photographically recording the results of your research. Equipment consists of a camera which may be used horizontally or vertically with 24" bellows draw and an illuminating unit mounted on the supporting base. With a Micro Tessar Lens the camera may also be used for photographing gross specimens.

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INSTRUMENTS FOR MILITARY USE, EDUCATION, RESEARCH, IN-
DUSTRY, AND EYESIGHT CORRECTION AND CONSERVATION



FOR DEPENDABLE INSULATING

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Sandee

★ VINYL CONDUIT

★ VINYL TUBING

★ VINYL TAPE

*S*ANDEE is one of the foremost producers of flexible vinyl electrical insulation. Because of their superior qualities, our tubing, tape and conduit have been widely used in the electrical, radio, radar, aviation and automotive industries.

Some of the desirable properties include: 1. high dielectric and tensile strength; 2. low water absorption; 3. flame resistance; 4. abrasion resistance; 5. resists most alkalies, oils, acids, and greases.

Imprinted terminal insulators and identification sleeves by Sandee have many advantages over electrical tubing of other types — they may be stretched over terminals, are not subject to aging or weathering, and stand up equally well in cold and hot climates.

Write for the new Sandee catalog. It contains complete information concerning our insulation items, as well as many other Sandee extruded plastic products.

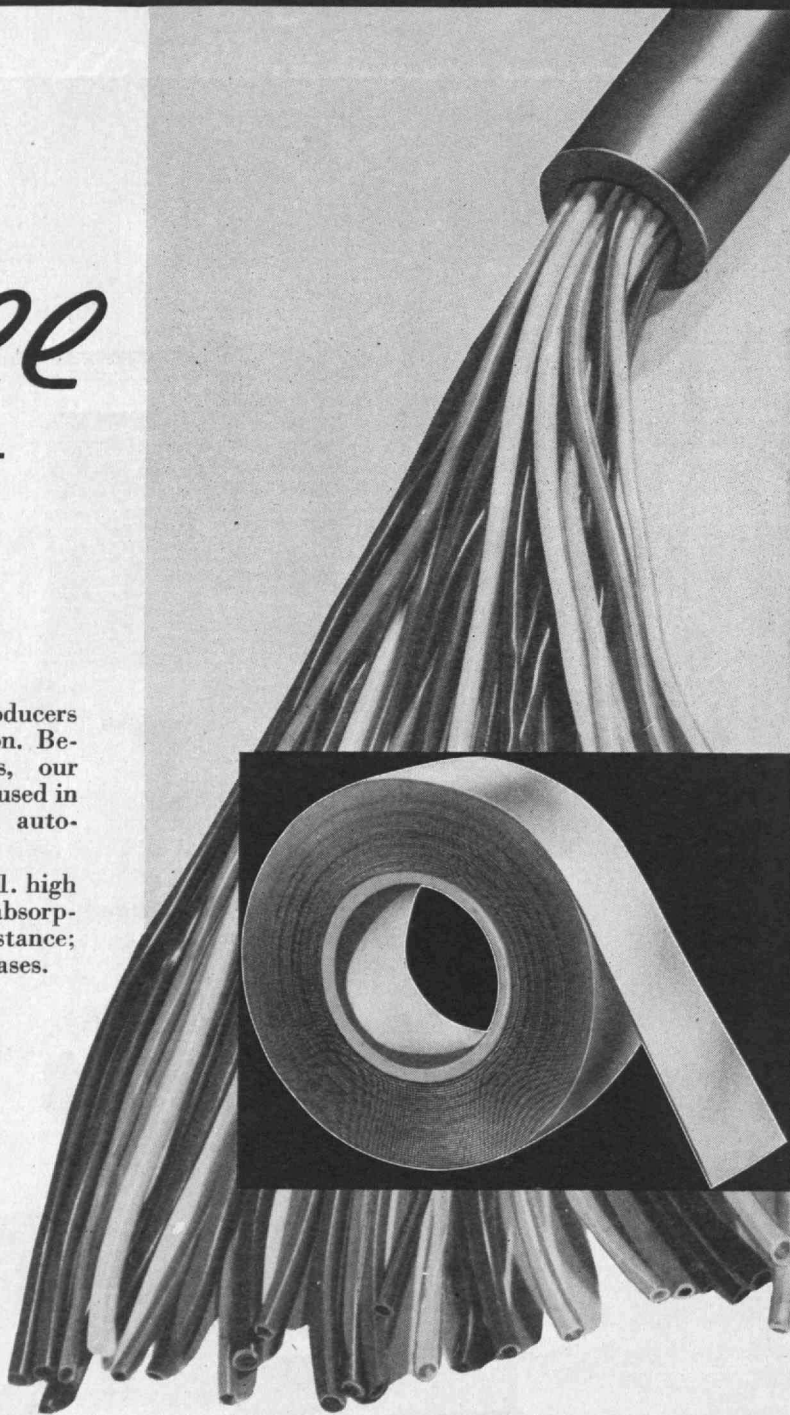
Elmer Szantay, M.E. '35
General Manager

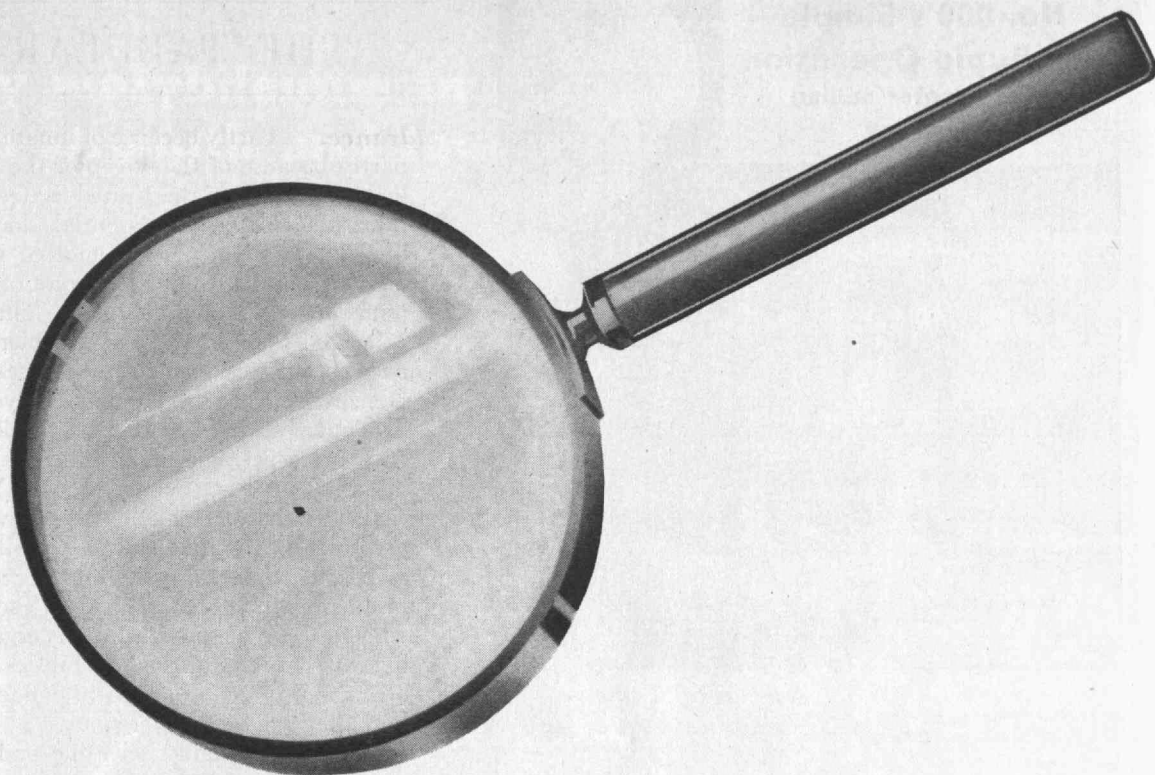
SALES REPRESENTATIVES IN 19 PRINCIPAL CITIES

Sandee Manufacturing Company

3945 NORTH WESTERN AVENUE • CHICAGO 18, ILLINOIS

EXTRUDED PLASTICS AND SPECIAL TOOLS





THE SIGNIFICANCE OF AN INSIGNIFICANT SPECK

The speck you see beneath the glass is a particle of coal—pulverized coal—magnified to 10 times its actual size. Insignificant though it looks, it is doing a tremendous job for victory. Ground to the fineness of flour, pulverized coal is being used to fire thousands of boilers which are providing the power and heat required to produce a vast volume and variety of war products.

A little more than two decades ago, after many years of experimental work, pulverized coal firing of boilers became a commercial success. Combustion Engineering played a major role in this achievement, and its equipment was used in the first large utility and industrial plants to be designed for pulverized coal firing.

Today practically all of America's large modern power stations and many hundreds of smaller plants fire their boilers with pulverized coal. The extent to which Combustion Engineering equipment has been chosen for these plants may be judged from the fact that the company's in-

stallations now have an aggregate pulverizing capacity of well over 60,000,000* tons of coal per year.

Because pulverized coal firing is the most efficient way of burning coal, its widespread adoption has meant savings running into millions of dollars annually, and, *of special importance today*, has substantially reduced the coal tonnage that our overburdened railroads must transport.

*Rated capacity, assuming equipment in operation 70 per cent of hours in year



C-E installations span the whole gamut of steam generating requirements from small stoker-fired boilers of less than 50 horsepower to the largest power station units.

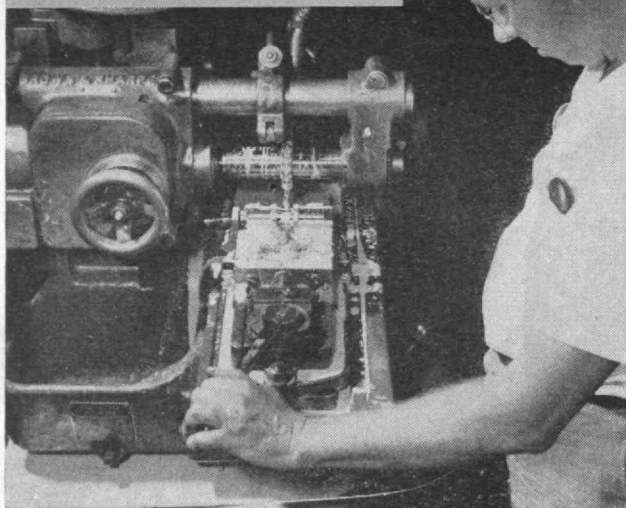


COMBUSTION ENGINEERING COMPANY, INC.

2 0 0 M A D I S O N A V E N U E , N E W Y O R K

A-725

**No. 000's Simple
and Rapid Operation
gives greater milling
efficiency**



Investigate the No. 000
Plain Milling Machine for
milling your small parts.



Brown & Sharpe Mfg. Co.
Providence 1, R. I., U.S.A.

Automatic Cycle —

Simply load . . . pull start-
ing lever — table returns
automatically to starting
position at completion of cut.

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Artisan Designs
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SPECIAL MACHINERY

for **Textile**
Paper
Mechanical
Chemical and
All Process Industries

ARTISAN experience and engineering skill in developing special machines from "ideas" through the "blueprint stage" to a finished product will help you transform engineering ideas into special machines for meeting the needs of profitable postwar markets.

ARTISAN engineers and workmen are skilled in the techniques of metal working. Their combined knowledge, ability, and experience for the past ten years in engineering and building special machinery have

been of value to many leading New England concerns. *We believe we can help you too.*

ARTISAN is not too big to do careful engineering on small jobs, to work cooperatively with your staff on a confidential basis, and to make last-minute changes in machine design to meet changing requirements.

For a qualified engineer to call to discuss your equipment requirements, write or telephone

JAMES DONOVAN '28, *General Manager*

ARTISAN METAL PRODUCTS, INC.

211 Congress Street

Boston 10, Mass.

Telephone LIb. 6985

THE TABULAR VIEW

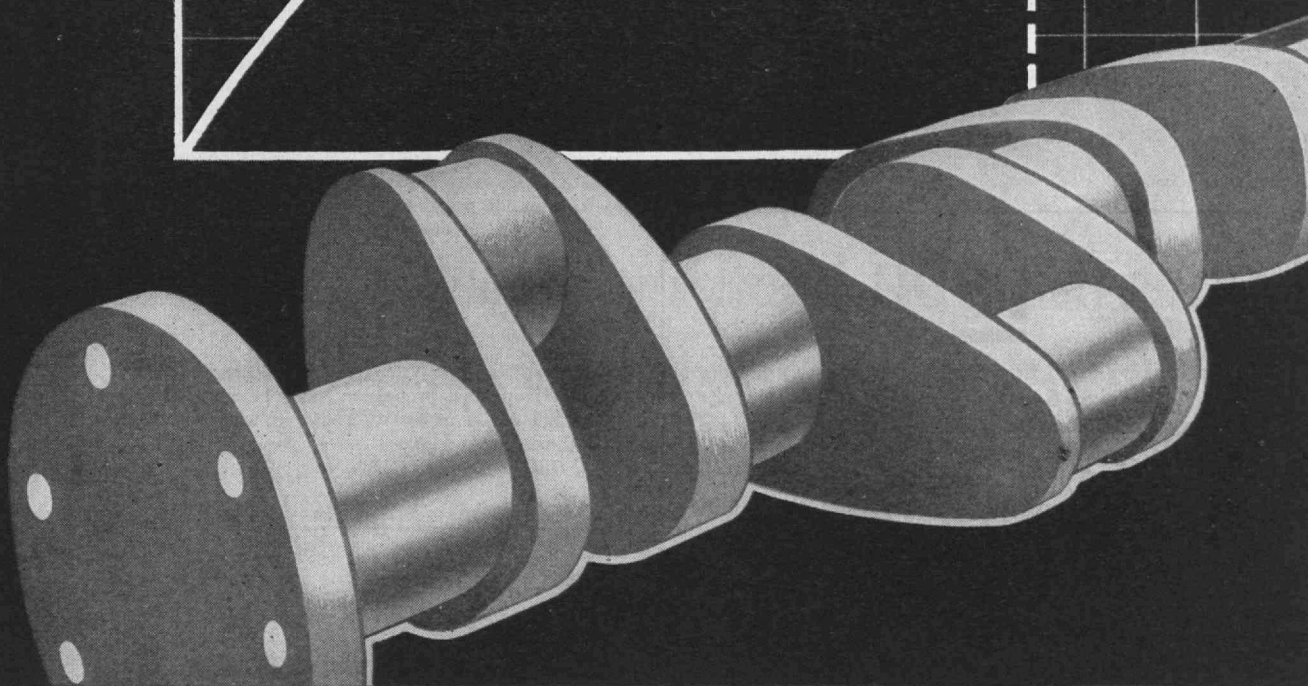
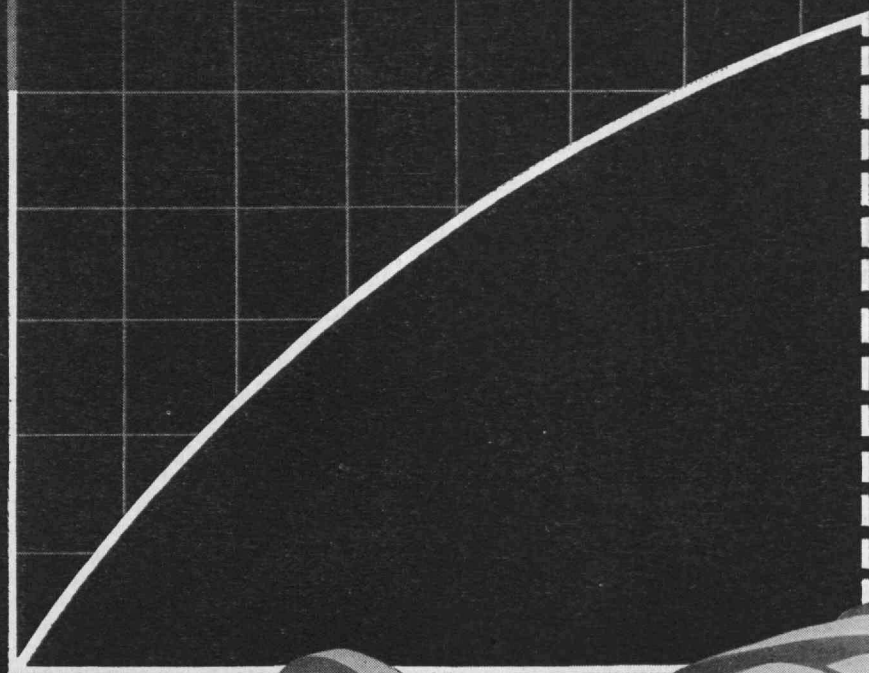
Advance. — Partly because of innate characteristics and partly because of the sweep of the land in which they live, the people of the United States have long counted railroads among the essential shaping conditions of life. The wail of the locomotive whistle is motif in many a ballad melody. The argot of the main line gives pungency to many an idiom. Through most of the good and some of the bad in American history of the past century, the rails run a thread of unifying steel. Hence railroad developments never fail of interest, particularly when they are of the kind which ERNEST A. DAHL, electronic engineer for the Rock Island Lines, discusses in this Review (page 361). It was inevitable that the railroad should take advantage of the expediting of communication permitted by radio and allied instrumentalities. But there are many special problems which such innovation encounters. Mr. Dahl, who has been at the heart of his organization's pioneering investigation of the possibilities of radio in railroad operation, is well qualified to define these and to show how they are being overcome.

Choice. — In a highly scientific and technological culture, it is logical that the natural symbiosis existing between universities and other social organizations should become closer and more crucial. Yet as the economic and social structure relies more and more on applications of the science and the techniques which universities teach, and as at the same time industry perforce expands and modifies those techniques through its own efforts, the possibility of divergence develops. Men possessing the rare combination of abilities essential to effective research are rare enough anyway; industry more and more needs them in its own laboratories and the universities need them as much as ever, both to spur university research and to train successors. Clear evaluation of the case from an industrial point of view is made (page 364) by LAURENCE A. HAWKINS who as executive engineer of the research laboratories of the General Electric Company acts as business manager and co-ordinator of the research activities of the more than 300 scientists in that organization. A graduate of the Institute in 1899, Mr. Hawkins has been associated with General Electric since 1903.

First. — Close relationship between science and government is taken for granted in our time, and is emphasized by the reliance of the nation upon scientific activity as a bulwark in the war. How the first union of the forces of science with those of government took place under the impetus of an earlier war is described in this Review (page 367) by I. BERNARD COHEN, instructor in physics at Harvard and thoroughgoing student of the history of science, particularly in its bearings on American life.

Formula. — From JOSEPH C. RILEY, Emeritus Professor of Heat Engineering, this Review presents (page 359) a pungent bit of mathematical confection. From the time of his graduation from the Institute in 1898 until his retirement in 1941, Professor Riley, who served as a major in the Air Service in the first World War, was a member of the staff of Technology's Department of Mechanical Engineering.

**Only molybdenum in cast iron improves
both strength and toughness**



CLIMAX FURNISHES AUTHORITATIVE ENGINEERING
DATA ON MOLYBDENUM APPLICATIONS.



MOLYBDIC OXIDE, BRIQUETTED OR CANNED •
FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

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YOU CAN CONTINUE TO COUNT ON THEM

Starrett Tools and skilled hands just naturally go together. The painstakingly acquired craftsmanship of the "world's greatest tool-makers" puts into a Starrett "Mike," Vernier Caliper, Height Gage, Dial Indicator or other precision measuring tool that certain *feel, handiness, finish*—call it what you will—that the skilled worker recognizes instantly and that inspires speed, confidence and constant accuracy on precision work.

That is why it pays to standardize on Starrett's and to specify them when you order from your supply house.



THE L. S. STARRETT CO., Athol, Massachusetts, U. S. A.

WORLD'S GREATEST TOOLMAKERS

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

IF

you are looking for a firm of manufacturing engineers to work with you on a new machine problem—why not get in touch with Rodney Hunt? This firm has complete foundry, metal-working and wood-working facilities, a highly trained staff of supervising engineers and over a hundred years' experience. Rodney Hunt specialties are:

STAINLESS STEEL TANKS (patented construction gives extra strength per weight, reduces cost)

INDUSTRIAL ROLLS (wood, plastic, metal or rubber covered—special rolls of all kinds—patented head construction keeps shafts tight)

TEXTILE WET FINISHING MACHINES (a leader in this field for 100 years—many new stainless steel constructions and improved designs for dyeing machines, washers, fulling mills, etc.)

WATER WHEELS AND REPAIRS (water power equipment from dam to tail-race—"Hi-Test" runners set record 93.38% efficiency in Official Holyoke Test)

GATES AND HOISTS (a complete line of floor stands, bench stands, gear hoists, timber and metal gates and accessory equipment)

IF your problem happens to fall in one of these fields, you'll find



TOPS for intelligent, prompt service.

RODNEY HUNT MACHINE COMPANY
18 Hill Street • Orange, Mass.

MAIL RETURNS

Brilliant

FROM GORDON R. WILLIAMS, '29:

Permit me to congratulate The Review and Paul Cohen, '35, on his excellent article in the February issue entitled "The Limiting Resource." As a civil engineer who has for 15 years studied hydrology and applied it to the design of hydraulic structures, I feel qualified to say that Mr. Cohen's assembly of accurate information and his method of presentation are nothing short of brilliant.

As a rule I find it distressing to read the average newspaper or magazine article on problems relating to our water resources. Most of the articles are written by advocates of reforestation, soil conservation, wild life conservation, national parks, or sportsmen's clubs who believe that any exaggerated or distorted statement or utterly false theory may be presented for public consumption if it aids a worthy cause.

I consider Mr. Cohen's article to represent the highest type of journalism.

Washington, D. C.

FROM JUDSON C. DICKERMAN, '95:

The article in The Review on the importance of water in human economic development was extremely interesting to me. As you may know, I surveyed many of the water power developments for the Federal Trade Commission in its utility investigation in 1929-1935, and studied rainfall statistics, runoffs, flood effects, and such matters, and observed the state of agriculture and industry in nearly every state in the Union. I had also good opportunity to observe conditions in Mexico and Brazil. Always I was struck with the basic importance of the available water. The figure of 1,000 to 3,000 pounds of water required to raise a pound of wheat is very compelling. I learned that less than 20 inches of rainfall meant limited chances for human settlement except in occasional oases where the residual water from, say, 100 acres could be gathered to irrigate one acre. Also I saw lands seriously damaged by irrigation where the drainage away of part of the irrigated water to remove the dissolved salts was not practiced. A fine thing to impress the intelligent consideration! I for one am always glad to see articles like that in The Review.

Charlottesville, Va.

Wanted

FROM LIEUTENANT WILLIAM N. RICHARDSON, '42:

... Hope "jet propulsion" may be included in the later Reviews. It is difficult for us here to keep pace with many new developments of the times. . . .

New Guinea

Speed with Economy



Mack International Motor Truck Corp.

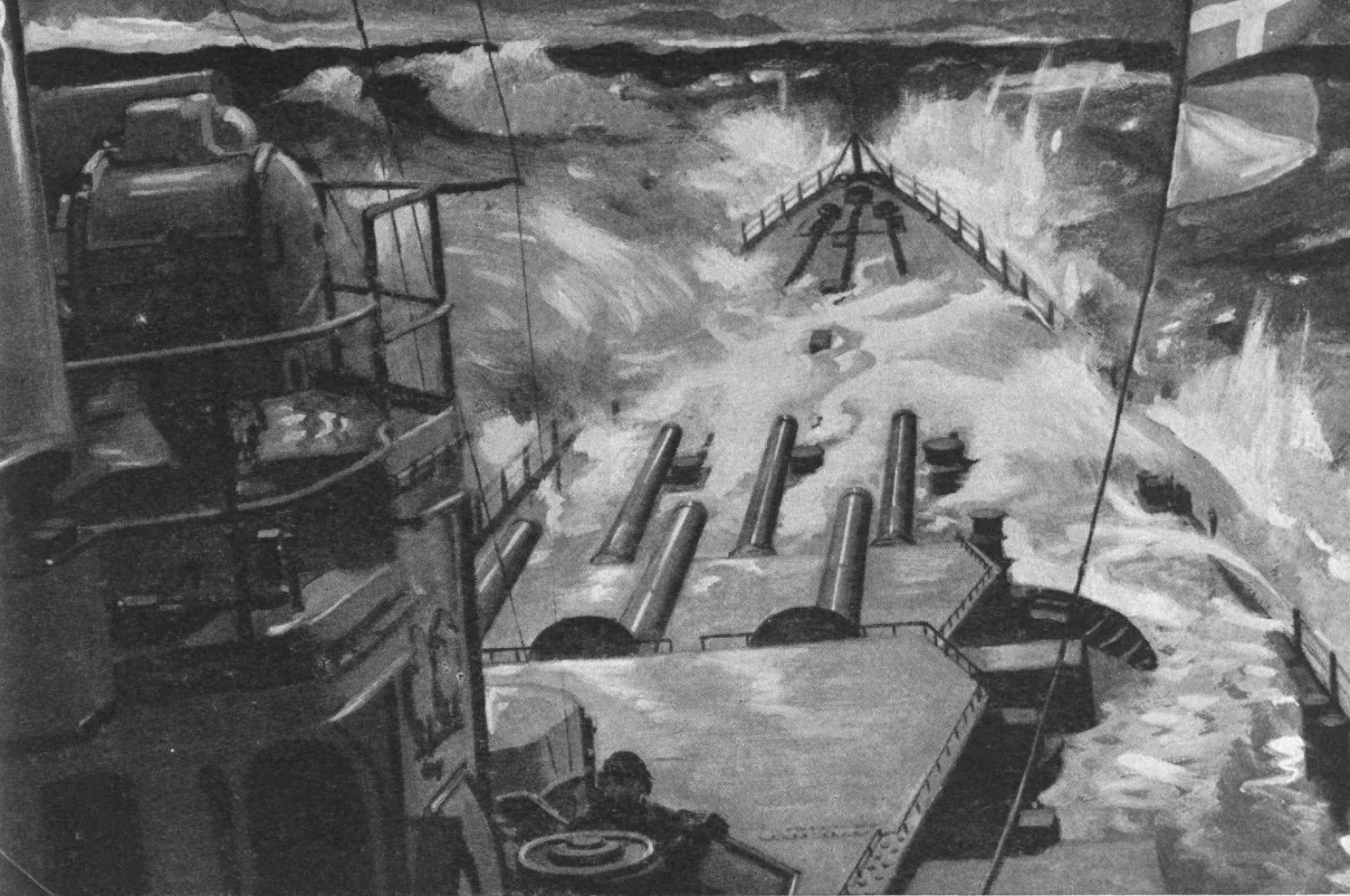
Getting your new factory into operation quickly may mean thousands of dollars to you—in production, sales and customer good-will. Our slogan "Speed with Economy" means what it says.

W. J. BARNEY CORPORATION

101 PARK AVENUE, NEW YORK

INDUSTRIAL CONSTRUCTION

Alfred T. Glassett, '20, Vice President



WHY A BATTLE WAGON WEARS 4,000 SAPPHIRES

THE DELICATE PRECISION instruments so essential to the navigation of ships of the sea—and ships of the air—are dependent for accuracy on jewel bearings. There are 4,000 of them in a battleship.

Before the war, synthetic sapphire for these bearings came from abroad. Today, because of concentrated efforts over the past 36 months by THE LINDE AIR PRODUCTS COMPANY, a Unit of UCC, America need never again depend upon an outside source for this hard, smooth, wear-resistant material.

This unusual UCC research project led to the quantity production of Linde sapphire and Linde ruby. These are produced in the form of a single crystal shaped like a cylinder—known as a boule (pronounced “bool”)—and also in the form of rods of varying sizes, for more efficient and economical fabrication.

In addition to its indispensability in bearings for military instruments, Linde sapphire already is being used

by industry to combat wear in precision gauges, cutting tools, thread guides for textile mills, barometers, compasses, and watches. Phonograph needles that last indefinitely are another interesting use.

American synthetic sapphire production indeed is a tribute to American ingenuity, and promises much for the Nation's postwar progress.

For additional information send for the folder P-4 “Synthetic Sapphire Production.”



These objects are Linde sapphire and Linde ruby in boule and rod form—materials of vital importance in military and industrial use. Because they are single crystals that are second only to the diamond in hardness—and can be given a surface that is perfectly smooth—they are invaluable in bearings and in countless other parts where there is wear.

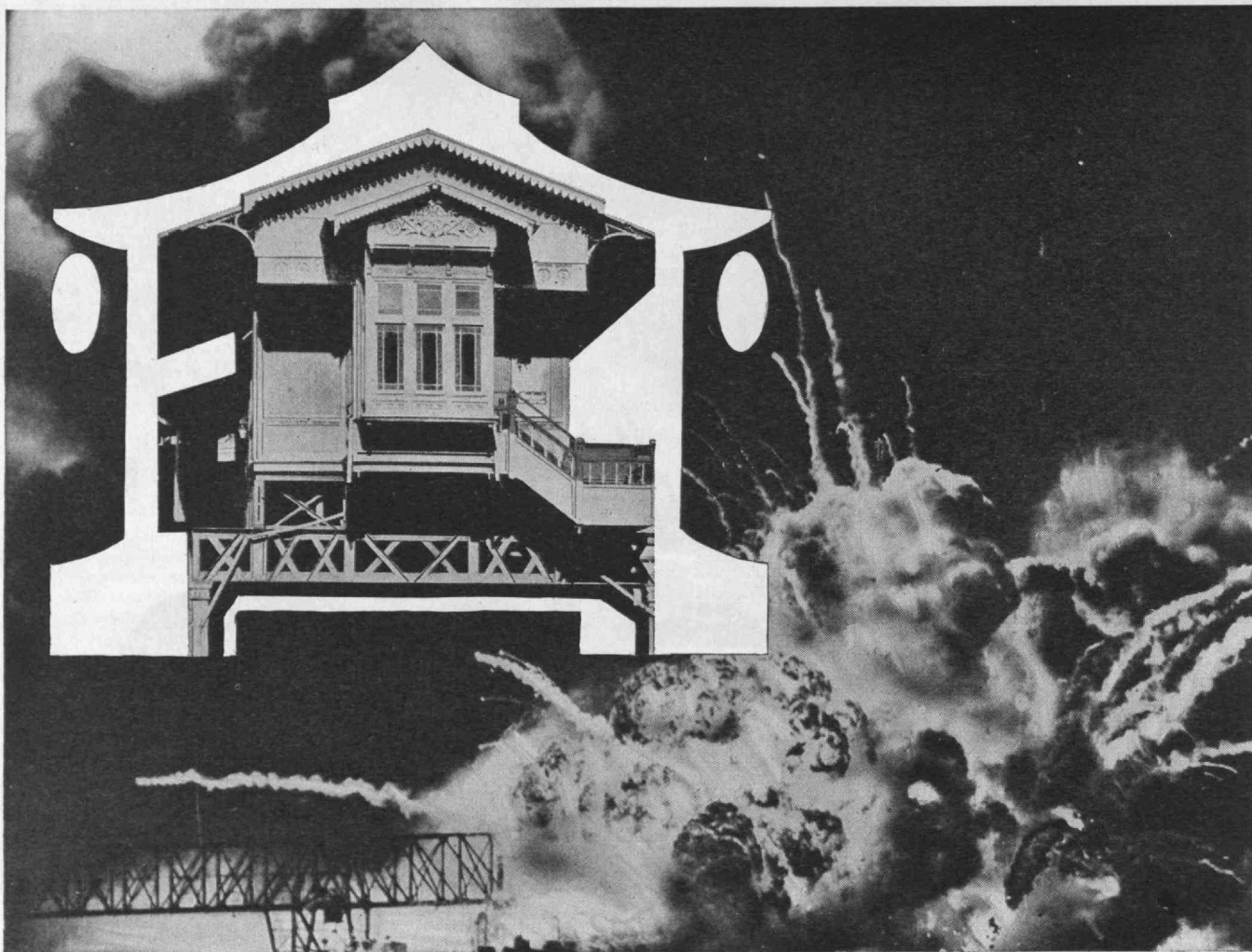
BUY UNITED STATES WAR BONDS AND STAMPS

UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York 17, N. Y.

Principal Units in the United States and their Products

ALLOYS AND METALS—Electro Metallurgical Company, Haynes Stellite Company, Kemet Laboratories Company, Inc., United States Vanadium Corporation
CHEMICALS—Carbide and Carbon Chemicals Corporation **PLASTICS**—Bakelite Corporation **ELECTRODES, CARBONS & BATTERIES**—National Carbon Company, Inc.
INDUSTRIAL GASES AND CARBIDE—The Linde Air Products Company, The Oxneld Railroad Service Company, The Prest-O-Lite Company, Inc.



THE 6TH AVENUE "EL" WAS **NOT** SENT TO PEARL HARBOR!

In the January 22nd issue of TIME Magazine, we ran this illustration with a headline reading: "Remember when we sent the 6th Avenue 'El' to Pearl Harbor?"

This was a mistake.

The 6th Avenue "El" was *not* sent to Pearl Harbor — thanks to the straight thinking and vision of Mayor F. H. LaGuardia, Stanley M. Isaacs, Manhattan's Borough President, the support of the other members of the Board of Estimate of the City, and the strict adherence of the Harris Structural Steel Company, contractors for this work. The contracts for the demolition of the "El" stipulated that the scrap iron would not be sold or exported directly or indirectly to any foreign country with the exception of Great Britain. Not one pound of this scrap ever left the United States.

And that was three years before Pearl Harbor — back in the "appeasement" days!

It's too bad there weren't more men thinking straight in

those days. Because more than 6 million tons of scrap was sold to the Japs during those three years. And many an American boy was hit by fragments of that American steel — fragments of our own weak thinking in the past.

Well, we're strong now. America will come out of this war the most powerful force on earth, and the time to start *thinking strong* is now.

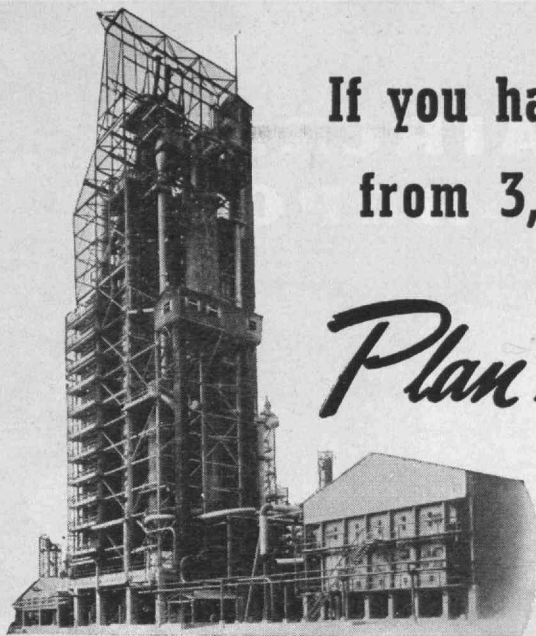
Our greatest immediate contribution to American strength in the future—strength here at home—must be the provision of jobs for our returning fighting men; jobs and security for all!

And today, the engineers of the machine tool industry can greatly help the men of government and of industry to provide those jobs . . . to plan now for the reconversion of our tremendous resources in materials and plant equipment to all-out production for a better America! One of these engineers is a Bryant man. We urge you to call him now.



BRYANT CHUCKING GRINDER COMPANY

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VERMONT, U.S.A.



If you have a plant that processes
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*Plan NOW to meet Post-War
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Every indication points to a post-war octane rating of 80 for regular gasoline and at least 85 for premium motor gasoline. Competition may send both ratings even higher.

The economical production of 85 and higher motor method octane motor gasoline with optimum T.E.L. addition points towards the wider use of catalytic cracking, a process now within the economic range of small refining operations.

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larger plants; and in addition, the small plants using TCC Synthetic Bead Catalyst will also show high liquid recoveries of quality products.

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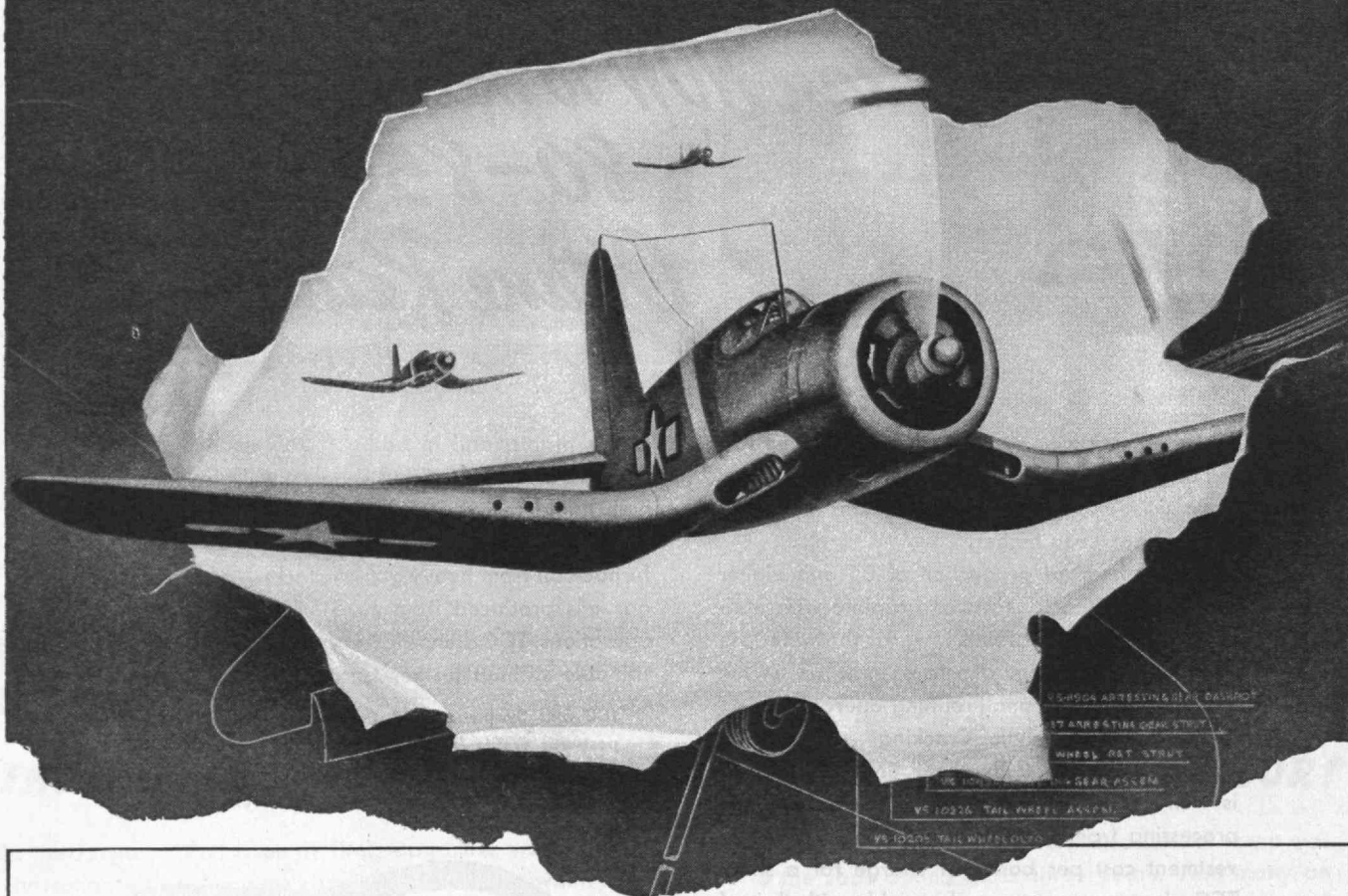
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LUMMUS

PETROLEUM REFINING PLANTS

GOOD YEAR AIRCRAFT PRODUCTION REPORT



CONTRACTS: NOAS1871-99529-NOAS951

CORSAIR FG-1

COMPLETE AIRPLANE
AND SPARE COMPONENT PARTS

CONTRACT RECEIVED: *FEBRUARY 1942*
FIRST PRODUCTION UNIT COMPLETED: *FEBRUARY 1943*
1,000TH PRODUCTION UNIT DELIVERED: *MARCH 1944*
2,500TH PRODUCTION UNIT DELIVERED: *JANUARY 1945*

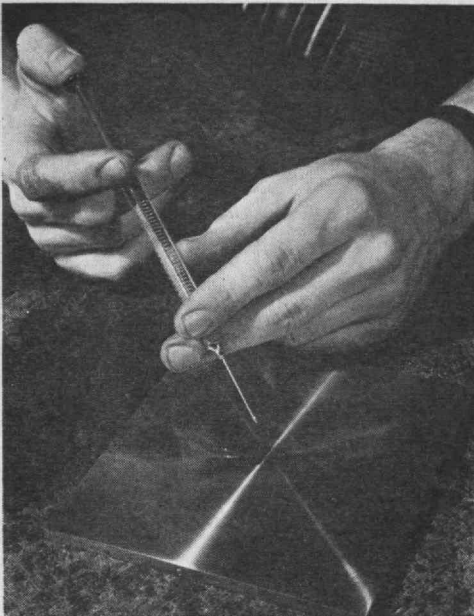
REMARKS: At the time the contract was undertaken, Goodyear Aircraft Corporation did not have a plant large enough for this giant job. Yet within one year a modern conveyor-line assembly plant was erected and tooled, 10,000 employees trained in quantity production techniques, and the first unit completed. In the second year, output was increased to several hundred finished aircraft and spare components per month. During this period, the plane was modified to reflect combat experience involving many improvements which were incorporated. Yet the flow of aircraft was maintained in accordance with Navy expectations.

Goodyear builds components for 16 different types of Army-Navy aircraft, including complete airships as well as the Corsair.



GOODYEAR AIRCRAFT CORPORATION, Akron, Ohio

Litchfield Park, Arizona



Bubley for Standard Oil Co. (N. J.)

No, it's not Dr. Kildare readying for surgery. An engineer is preparing a "spreading" test for instrument oil, in which the diameter of the drop as it spreads over the highly polished steel plate is recorded day by day.

THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

EDITED
AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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From a photograph by Victor de Palma from Black Star

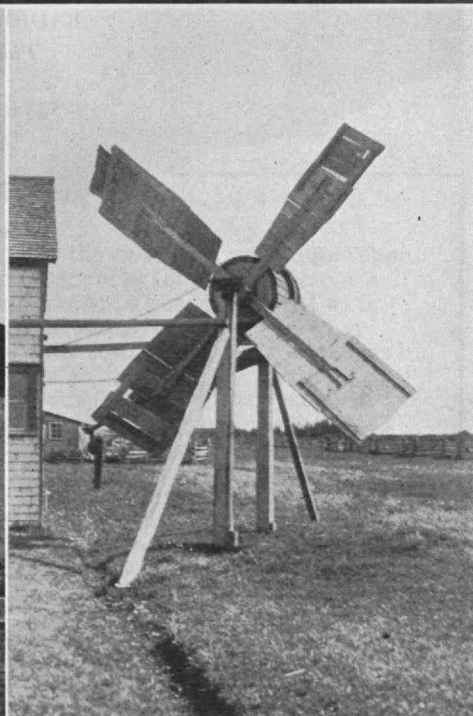
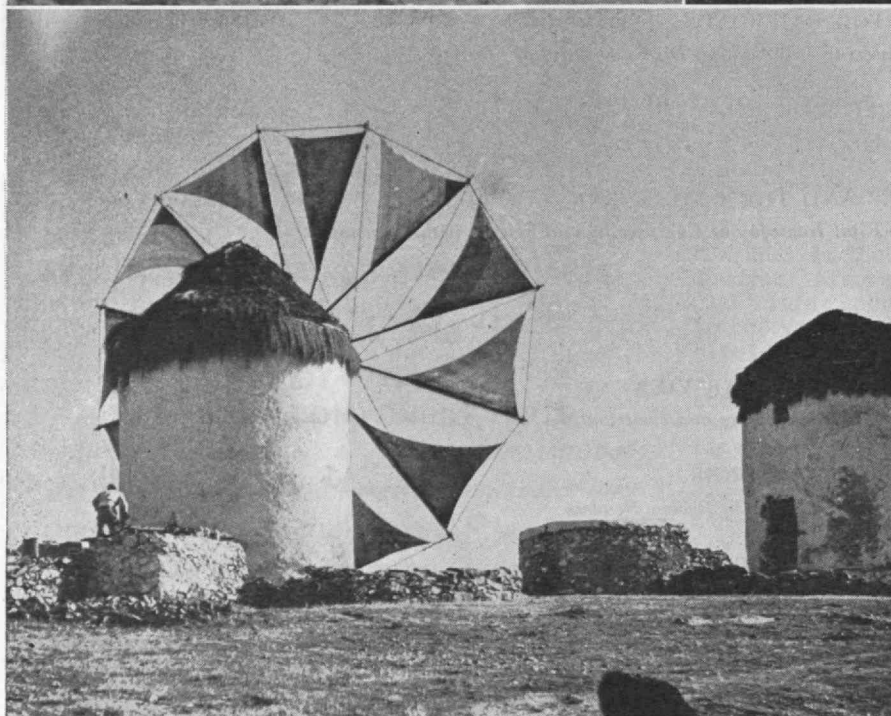
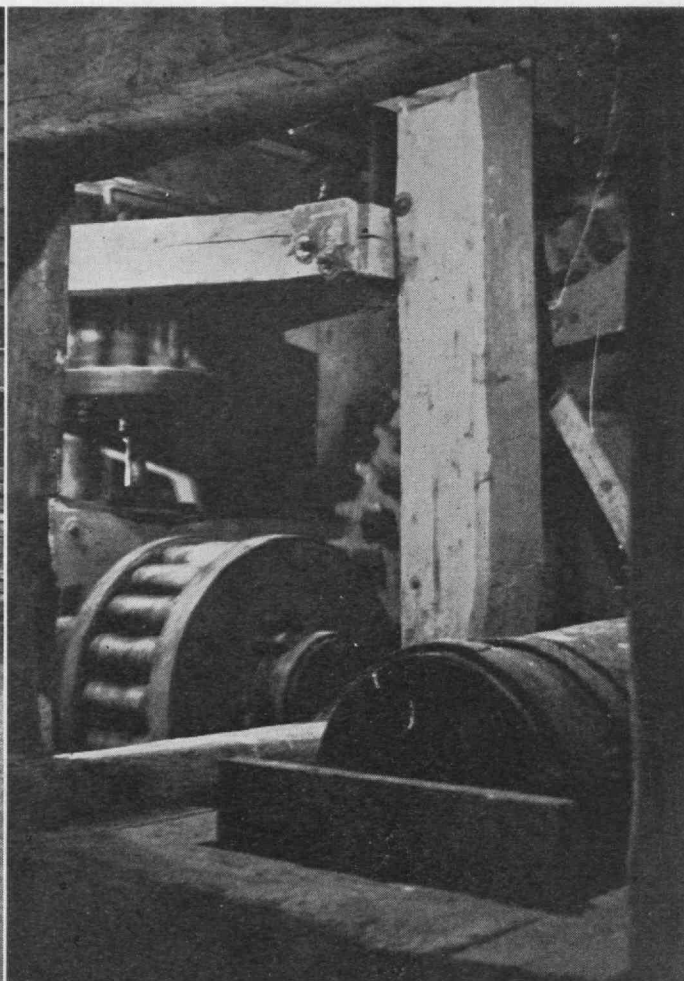
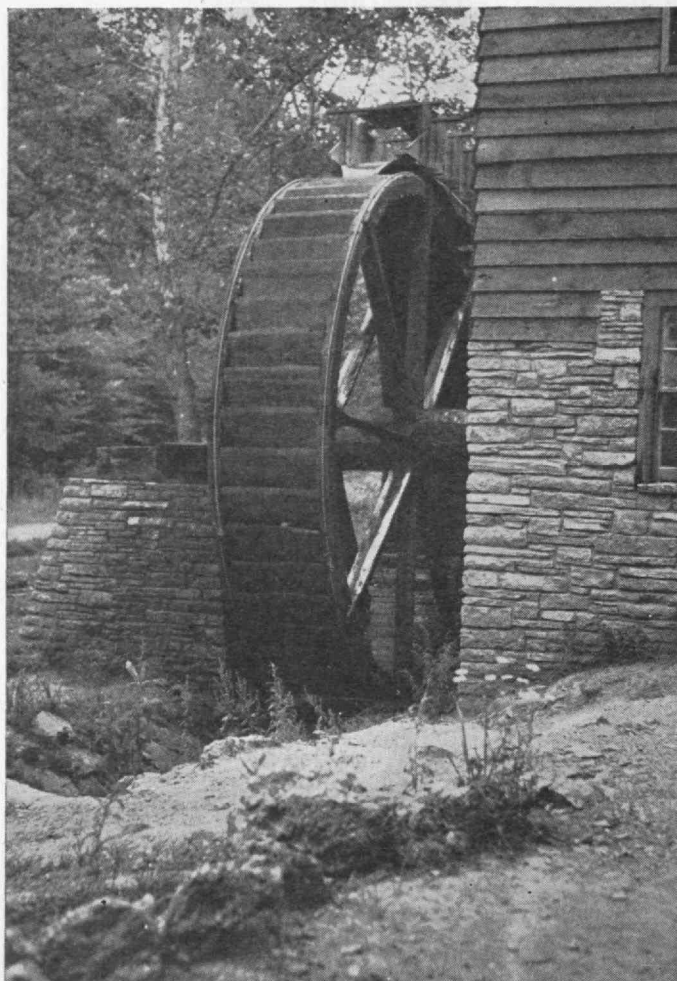
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Upper photos, Paul Cohen, '35

B. W. Irwin, '38

W. W. Lewis, '89

POWER

. . . as elementary technology has secured it from water and from wind. At the top left is a restored grist-mill near Norris Dam, dating from 1798, with, at the upper right, the old-time wooden reduction gearing from the overshot wheel to the millstones. Below, at left, is one of the windmills used for grinding grain on the Greek island of Mykonos, and beside it is a windmill on the Gaspé Peninsula, Quebec.

THE TECHNOLOGY REVIEW

Vol. 47, No. 6



April, 1945

The Trend of Affairs

Long or Short?

THE question of what constitutes a work week of optimum length has been troubling industry almost since the birth of the factory. With every war the question assumes additional interest, for although the lengthening of working hours seems a tempting means of increasing output, the results are not always as expected. The exact effect of a change in working hours, however, is difficult to isolate, for while the length of the work day and the work week is a factor in production, so are the diet and health of the workers, the life they lead outside the plant, the adequacy of their training and equipment, the physical environment in the plant, and above all, the complex of feeling and action termed morale.

Obviously aware of the varied ramifications of the question, the Bureau of Labor Statistics has recently issued some cautiously worded findings by Max D. Kossoris on the effects of long working hours under wartime conditions in this country. While the general conclusions are not unexpected, the report, which uses the case method, is particularly interesting for the way in which it illustrates how much individual situations can differ in their reactions to changes in the work week. Maximum efficiency (output per hour) is highest with an eight-hour day and a five-day week; the addition of another eight-hour day does not decrease efficiency to any great extent; further increases, however, are apt to feel the effects of the law of diminishing returns. A seven-day week as a steady program is definitely uneconomic, and, as hours lengthen, absenteeism increases. Yet in one plant, a determined drive that appealed to the patriotism of the workers resulted in less absenteeism under a long week than had existed during the short one.

In a plant whose product was forgings, the output for a 52-hour week was almost exactly the same as it was for 58 hours. Except for men leaving to join the armed forces, there was little turnover among the all-white personnel. Wages were high and morale was considered excellent.

But the work was both heavy and hot, with temperatures reaching 120 degrees F. during the summer. It appeared that a 52-hour week represented just about the limit of the men's endurance, and that the value of further increases in hours was dissipated by the greater resting time required and by absenteeism, some of it induced by the need for recuperation.

On the other hand, when hours were increased from 48 to 60 at a plant where a large percentage of the workers were women and where the product was mostly small, light metal parts, output increased directly in proportion to hours. Apparently the rhythm of work could be maintained as satisfactorily over a 10-hour day as over eight hours.

It was noted that the effect of a change in hours when the workers were operating under wage incentives was different from that when they were being paid on straight hourly rates. Under the former conditions efficiency drops more rapidly as the work week lengthens, the effect being more marked if the day is lengthened from eight to 10 hours than if an extra eight-hour day is added. Since the pace seems to be less strenuous under straight hourly rates, there are more reserves of energy for the workers to draw on. That cause and effect are not always so neatly connected, however, is illustrated by the case in which a foundry simultaneously reduced hours from 63 to 52 and changed from hourly rates to piece work. Output actually increased. Under any wage condition, a smaller gain per hour added must be expected when the work is heavy than when it is not taxing physically.

Fever Makers

PEOPLE have been killed by sterile distilled water, for this epitome of pure innocuous materials may contain substances called "pyrogens." This term means literally, "heat makers." Injected into the body, pyrogens cause fever, which is sometimes sufficient in intensity to be fatal. Pyrogens are a problem in therapeutic prepara-



Robert K. Phelan, '30

This terrene negative is the Hong Fatt opencast tin mine near Singapore, one of the largest such mines in the world. In 1938, its depth was 375 feet. Dark terraces at the right, not being worked, are covered with grass thatch to prevent rain from washing away the sides.

tions, but only in those administered by injection, for they have no effect when taken into the body in any other way. Pyrogens apparently are products of bacterial activity. Not surprisingly then, they may exist in vaccines, which are made from weakened or killed pathogenic bacteria. Pyrogens also may occur in antitoxins, antibiotics like penicillin, serums, saline or carbohydrate solutions, or in any other injection preparations, because bacteria are ubiquitous, and may generate pyrogens in such preparations before they are sterilized. Subsequent sterilization, as by heat, may reduce pyrogens, but cannot be relied upon to inactivate them completely. Even distilled water used to make solutions for injection may contain pyrogens produced by bacterial activity in the water before distillation, or in cul-de-sacs of the still. These pyrogens may distill over with the water, and once again sterilizing heat applied later may or may not destroy them.

Pyrogens occur in such minute concentrations as to impose obstacles to detailed study similar to the ones which hampered exploration of those other elusive substances, the vitamins. Hence little is now known of the exact nature of pyrogens, so that methods for exclusion of them from injection preparations are largely empirical. Therefore such preparations, before they can be released for sale and use, must be tested routinely for the possible presence of pyrogens.

Fortunately the rabbit has the same susceptibility to pyrogens as has the human being. Hence this animal is used in the standard test for pyrogens, established by the quasi-official *United States Pharmacopoeia*. This procedure requires that 10 cubic centimeters of the test substance per kilogram of body weight be injected into each of five rabbits. If three or more of these animals show an individual rise of 0.6 degree C. or more in rectal temperature in any of three hourly observations, the test is positive. If only one or two of the rabbits show temperature increases, the test is repeated with a second group of five animals. Fever in two or more of these

then indicates a positive test. Exacting measures must be taken to assure that all of the apparatus is pyrogen free.

Originally, temperatures of the experimental animals were measured with regular rectal thermometers. But rabbits are timorous creatures. If distressed through handling by a technician whom they do not know, or who lacks poise and assurance, they will develop temperatures for that reason alone. This difficulty imposed the necessity of training highly skilled technicians for the pyrogen test. Also the handling of animals every hour made the test tedious. Both of these problems have now been solved by application of the in-dwelling rectal thermocouple. Through use of this instrument, the rabbits may be held during the test period in stocks which restrict their movement sufficiently to allow the thermocouples to remain in place. Once the rabbits are in the stocks and the thermocouples have been inserted by a technician to whom they are accustomed, they remain comfortable and placid in their "rabbit hotel" until the test is completed. With this arrangement, any operator may take temperature readings from the leads of the thermocouples, without disturbing the animals in the least. Not less important, temperatures may be read in this way much more quickly than they could when the animals were handled and thermometers inserted for each reading.

Despite the previously mentioned obstacles to establishment of the exact nature of pyrogens, this study is now being diligently pursued. Reports appearing as late as 1943 confirmed previous conclusions that the pyrogen molecule contains nitrogen. One of these studies went so far as to suggest that nitrogen be used as an index of pyrogenic strength. But recent research on this subject, using pyrogens derived from the bacteria causing typhoid and paratyphoid fevers, from *Pseudomonas aeruginosa*, an organism commonly infecting open wounds, and from *Proteus vulgaris*, a widely occurring, free-living bacterium, shows that more intensive purification produces active

pyrogens entirely free of nitrogen. Furthermore, the ratio of carbon and hydrogen which is found, together with other evidence, suggests that these pyrogens are carbohydrates.

Those concerned with production of preparations for injection look forward to consummation of pyrogen studies through demonstration of the exact nature and sources of these troublesome substances, in order that the present empirical methods which are employed for the control of them may be replaced by more rational measures.

A Receipt for Pie

BY JOSEPH C. RILEY

IT is commonly known that the ratio of the circumference to the diameter of a circle is greater than 3 and less than 4. Shortly before the close of the Eighteenth Century, it had been proved that this magnitude is not among the rational numbers; and finally, about a hundred years later, Lindemann proved that it is transcendental. As far as concerned mathematics, there was no more to be said.

It is a major delight of mathematicians to compress a great deal into a word or two, whether ordinary mortals comprehend them or not. But if we may presume to elucidate, they meant that the ratio in question is not exactly equal to that of any two integers, however great, and moreover that it cannot even be a root of an algebraic equation.

The first of these two pronouncements is sufficient for our purpose. The second is more remarkable, and was very much more difficult to prove; and incidentally, it was what at last put the kibosh on the circle squarers, convincing them that with ruler and compasses alone, they might as well quit. But let's forget about that, and realize that the ratio in question, not being equal to the ratio of two integers, cannot be represented exactly by 3 and

a decimal having a limited number of places, nor by 3 and a decimal which, after a certain point, has a group of digits continuously repeated. However, many generations before this was known, Ludolf, of what is now Cologne, had made a brave attempt to work the ratio out as a decimal and bring it to an end, or else make it show a recurring form; for if he could do either one, no matter how many figures it might have, he could find two integers whose ratio would be equal to it. He worked it out to 35 places of decimals without succeeding; but he knew he was right as far as he went, and when he died, his friends memorialized him by engraving the long string of figures on his tombstone. Unto this day, his countrymen refer to it as *die ludolfsche Zahl*.

After Ludolf had made his attempt, many other investigators took a shot at this elusive ratio. Even Leonard Euler had a try, busy as he was with other matters which some people think were more worth while. He was good at it too, but when he said he had got the first 20 places in an hour, we think he was bragging. Anyhow, the computers kept on trying, long after they were told it was no use, each one going a little further. Until at last, only a few years before Lindemann's disappointing announcement fell like a wet blanket on all who might otherwise have had a go, a certain Mr. William Shanks took up the trail with grim determination, and actually pursued the ratio to 707 places! But still he hadn't caught it or even cornered it, and apparently he never realized that the chase was hopeless. Yet as we look back toward him, we are ready to bet that his record of 707 will never be beaten. There is magic in that number whichever way you look at it.

In our day, it is considered good form to honor a mathematician but to ignore a computer, for the one is a scientist, and the other, at best, a mere "technician." So if Bill Shanks and his *number* are ever mentioned, it reminds us of Bill Stumps and his *mark*. We chuckle at the homely British sound of his name, and say something to the effect

A *terrene positive* is offered by rice terraces in the Mountain Province of Luzon. Built by the Ifugao, their walls are from four to 18 feet in height. Estimates are that 12 to 15 centuries were required to build the terraces in Mountain Province, which have a linear extent of 12,121 miles, approximately half the distance around the world.





Roger Sturtevant

that he wasted his time chasing a rainbow, with no useful purpose and no reward. But think how long and arduously he must have figured! And Ludolf got a memorial, but Shanks, with twenty times the precision, got none. So let's give him this:

Now I know a ratio evaluated by Shanks
which all known reliable computers
express decimally
and we all remember this letter π
chosen from the old alphabet
men of classic erudition adore.

By writing under each word of the above sentence the number of letters in it, we have the value of π correct to the thirty-first place of decimals; and we stop there, perforce, because the next figure happens to be a zero.

No interior corridors at all in the Sill Building in Bakersfield, California — rather, working in a region where climate not merely permits but fosters such a solution, the architects of this interesting structure provide cantilevered exterior sidewalks on the street fronts of the building. The various offices are reached by means of these, which are directly connected to the elevator. The continuous glass areas of the offices, moreover, are protected by the sidewalks so that glare is eliminated and the cooling load on the air conditioning system which Bakersfield summers require is reduced. Office space, not being cut by corridors, is lighted from both sides by continuous windows. . . .

If anyone thinks it's a pity to waste such a good mnemonic formula on plain Bill Shanks, the writer will admit that at first he thought so too, and had considered a more scientific or perhaps a classical allusion, mentioning instead, let us say, the great geometer, Euclid — whose name has the same number of letters. But it seems that Euclid wasn't much interested in this ratio, and in fact he let it severely alone. He didn't even designate a Greek letter to represent it.

The French are strong for the classics. They feed ancient history even to their motor mechanics. In a little blue-covered handbook of instructions for installing and servicing a certain make of airplane engine built in Paris during World War I, the manufacturer, on one page, directed how to check the circumferential clearance of the piston rings, and on another, how (Continued on page 390)



Roger Sturtevant

. . . The cantilevered sidewalks afford balcony views to visitors and occupants of the Sill Building. The office space secures an unusual degree of flexibility through the fact that windows and doors facing the exterior corridors are designed on a unit basis permitting ready interchangeability, and interior panels are constructed for easy removal or relocation. The air conditioning system has been so planned that no matter where a partition is placed, the resulting space unit is assured its proper amount of treated air. Architects for the building, which will ultimately be increased to six-story height with a seventh-floor superstructure for recreation and athletic facilities, are Franklin and Kump and Associates. John L. Reid, '31, Associate Professor of Architectural Design at Technology, now on leave of absence, was associated in the design of the building.

Radio for Railroads

Pioneering Investigation Discloses Ways of Meeting Special Problems Which Operating Conditions Impose

By ERNEST A. DAHL

RAILROADS have been taken to task severely by some members of Congress, newspaper columnists, and even some engineers, for not having made much use of radio communication, the inference being that radio is available to them for the taking. Many unfavorable comparisons have been made between the communication services of air lines and steamship lines using radio and those of railroads which have not employed it. As a matter of fact, there is nothing that aircraft or ocean vessels can use but radio. Regardless of how good or bad it was, radio communication was the only answer for them.

On the other hand, most of the country's railroads already have highly efficient communication systems. At present, for example, the Rock Island Lines owns and operates an automatic printer system between its 13 principal system offices and owns and operates a long-distance telephone communication system inter-connecting all principal offices. These circuits are handling more than 935,000 telegrams and 36,000 long-distance telephone calls per month, all of which pertain to the operation of the railroad. Train orders, messages exchanged between way stations, and commercial telegrams are not included in this figure. Practically all other railroads could tell a comparable story regarding their communications.

While radio provides the railroads with an additional and very necessary facility, it will not be the principal and only one, and, while handling important traffic, it will dispose of only a very small proportion of the total. In fact the railroad communication traffic that radio will carry will be almost entirely new and therefore in addition to that which is now being handled.

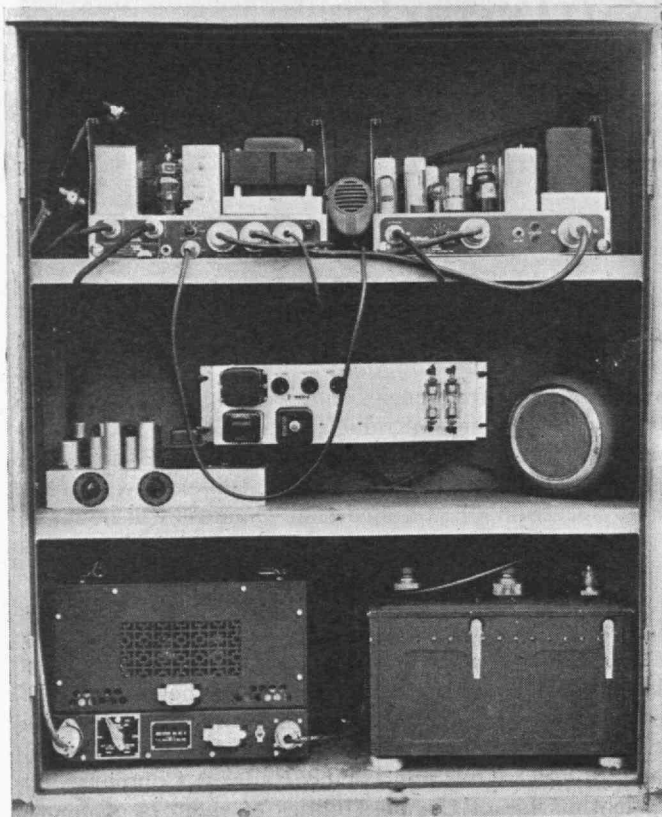
There are a number of answers to the question of why have the railroads not used radio in the past, and none of them depends on the financial investment necessary on the part of the railroads. Prior to the war there was not sufficient space in the radio spectrum into which to crowd communication channels for railroad requirements. In fact, in 1938 the Federal Communications Commission revoked the channel which had been assigned to the railroads for experimental use. The qualifications required by the F.C.C. for users of radio apparatus virtually precluded adoption by railroads of radio facilities for communication, for it would have been impractical, if not impossible, to require conductors, engineers, agents, yardmasters, and others to qualify as radio operators and obtain the required governmental licenses.

In the past few years, developments in the radio art have opened new vistas. Extension of the usable electromagnetic spectrum now makes it possible to utilize for communication frequencies that were only dreamed of a few years ago. These ultrahigh frequencies lie between 40 and 10,000 megacycles per second — from 40 million to 10 billion vibrations per second. With this expansion of the radio spectrum, it is hoped that channels will be made available for railroad use and that operators' requirements may be relaxed. If these hopes are fulfilled, an important step will have been taken in opening radio facilities for adoption and practical use by railroad systems.

Against this background of electronic developments and the utility of radio and allied devices in the operation of railroads, interest will attach to the story of one effort to bring railroad radio to reality. The study which the Chicago, Rock Island and Pacific Railway Company has made thus far of the possibilities of radio is of course important as it affects the operation of that particular system. It is also of importance as a sample of the kind of



Radio-equipped 5400-horsepower freight Diesel used in tests



A master control station as installed in a freight yard. An FM transmitter combination occupies the upper shelf. The middle shelf holds a monitoring amplifier and a line-controlled relay circuit. At the bottom is a 157-megacycle transmitter-receiver combination with power supply.

activity in which the railroads of the country may be expected to engage in the future.

Initiated early in 1944, the study has as its purpose to determine the benefits that may be derived from the use of radio, radar, and other electronic devices in railroad operation. Immediate consideration at the start was to be given to the use of radio for: (a) Communication between front and rear of trains and between trains and way stations; (b) Communication between yard offices and engines assigned to yard and terminal operation; (c) Communication between ground and engines and cabooses; (d) Safety and protection through the use of wave propagation and measuring devices that would provide a high-speed safety warning system to prevent head to head collisions. Such devices might be called a type of radar.

Radio communication on trains will have many other uses. It may be used to notify the engineer when switches are lined and crew is aboard; to enable engineer and conductor to check train orders and clearances and arrive at a common understanding of them; to notify the engineer when the train is clear of interlocking plant and public crossings; to enable the conductor to inform the engineer of location of cars in trains that are to be set out, or of cars to be picked up at stations in advance; or to permit the engineer to report to the conductor reasons for unscheduled stops so they can jointly determine any action necessary to get train in motion with minimum of delay.

There are also many time-saving uses for radio in railroad yards. Crews may be told of any additional switching required in the area in which they may be working, often a great distance from the yardmaster, or may be

instructed regarding the arrival and breakup of trains. Radio communication would also enable the yardmaster to instruct engine crews operating in other yards and on industrial sidings regarding additional work to be done in the area in which they are working, or in other yards when returning to the home yard.

From the standpoint of increasing safety of operations there are many indirect methods by which radio systems will materially help the operation of railroads. For example, the crew of one train may tell another of hotboxes, swinging doors, dragging equipment, or the like. Way station attendants may inform personnel on approaching trains about abnormal conditions ahead. Through radio contact with way stations, conductors or enginemen may report engine failures, derailments, and unusual delays to the dispatcher.

The Rock Island Lines, in common with many other railroads, has long been interested in, and in favor of, front to rear communication on its trains. In this connection it engaged in 1930 with the Automatic Electric Company of Chicago in a series of experiments to develop communication by means of the Shaver train telephone system, in which apparatus on the locomotive was inductively coupled to apparatus on the caboose by means of wires along the track. While these experiments met with some success in providing communication between the two ends of a train, it was felt that the inductive system could not be used satisfactorily at the 1930 stage of development. The need for increased railroad communications, coupled with phenomenal advances in electrical communication systems since 1930, thus warranted objective examination of the characteristics of carrier and space radio systems. Among the many problems which such study of adapting radio communication systems to railroads must meet, are those of proper power supply, mechanical shock and vibration, size of equipment, and size and type of antennas.

In railway service three types of power are available — 32-volt direct current on steam locomotives, 64-volt direct current on Diesel engines, and 115-volt alternating current in yard offices, way stations, and towers. To complicate the problem further no electric power of any kind is available in the caboose. Utility and maintenance made it highly desirable in the Rock Island investigation that radio sets be designed in two units — transmitter and receiver. A power supply of 115-volt alternating current was standardized for all purposes to make these units interchangeable. To obtain this power supply, special motor generator units were provided for the several types of locomotives and axle-driven generators and storage battery sets produced power for the cabooses. Adopting a standard power supply and designing the radio units so that they are interchangeable simplified manufacturing problems, since quantity production could be had at lower cost than could be obtained if equipment had to be built to meet the peculiar power supplies found in the railroad industry. The 115-volt alternating current power supply has been tentatively adopted as a standard by the Association of American Railroads.

The railroad's shock problem is a real one, requiring well-designed horizontal and vertical supports to cushion shocks such as are received on switch locomotives and on the caboose of long trains. The caboose of a 100-car freight train, for example, is called upon to change its velocity

instantly from zero to two miles an hour when the train starts up, since by the time it has taken up all the slack between the cars the locomotive may have attained a velocity of two miles an hour.

A major requirement is that the radio equipment be so engineered and designed that it will co-ordinate with and fit into existing fixed and mobile units. It does not seem advisable, for example, to redesign or make major changes in the locomotive or caboose, or to build large fixed antennas if they can be avoided. As far as possible, existing facilities and structures are to be utilized as they are.

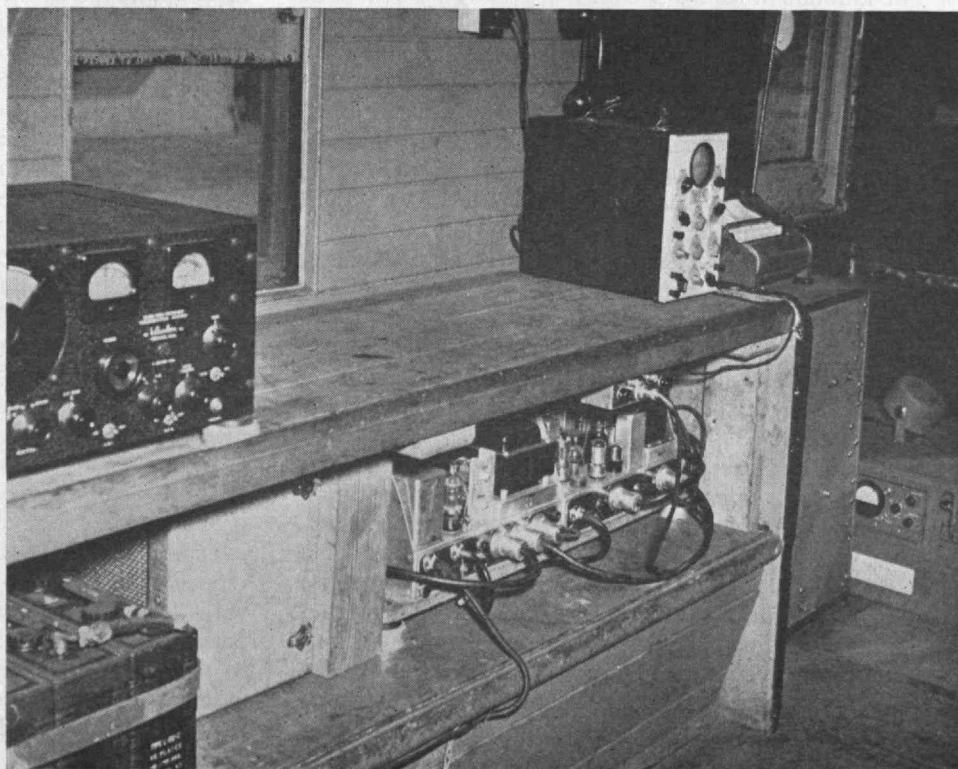
The antennas also present some difficult problems. On most railroads clearance between the roof of the locomotive and overhead structures is limited. The fact that the length of the antenna is inversely proportional to the operating frequency — a quarter-wave antenna is approximately 6 feet long at 40 megacycles, 18 inches long at 150 megacycles, and approximately 4 inches at 3,000 megacycles — hence is a feature favoring the use of microwave equipment in railroad service. Other problems which make antenna design a major engineering task in adapting radio to railway use include adequate signal intensity, orientation of the antenna with respect to the transmitter as the direction of travel changes, and the effects of tunnels and natural and man-made structures.

With such problems in prospect, it was evident that a rather extensive research program would have to be undertaken before a successful railroad radio communication system could be established. Earlier tests had been made by many lines, but most of them in co-operation with some particular manufacturer who furnished both the equipment and the engineering personnel. The Rock Island, however, undertook its own investigation with its own engineers. An experimental license was obtained from the Federal Communications Commission, and the co-operation of several manufacturers was solicited. The work which has been done is strictly of a research type, with the object of meeting the needs of the railroad.

By the early part of 1944, practically all the frequency channels up to 40 megacycles per second had already been assigned and were in use. Furthermore, demands were constantly being made on the Federal Communications Commission for additional channels for television, broadcasting, point to point transmission, and other services. Those making such requests contended that the interests of public safety, necessity, and convenience would be better served by allocating the few available channels for such services as already mentioned than by assigning them to use by railroads. The potential availability of a relatively great number of radio channels above 40 megacycles per second made it evident that this was a region well worth exploring.

At the time the research started, no tests had been made, to our knowledge, above 40 megacycles. None of the radio engineers with whom railroad communication problems were discussed knew, nor would they predict, the power requirements, the reliability of service, the most suitable frequency, or the best antenna to use. In other words, assuming that channels might be granted the railroads, it was not known whether the equipment that would probably have to be used would actually work well enough to provide the desired communication. This situation was confirmed by witnesses at the railroad radio hearing in Washington, D. C., during September, 1944. Thus it was necessary not merely to determine the kind of communication (induction or space radio) most suited to railroad use but also to survey a vast unexplored frequency spectrum, using relatively new and unfamiliar radio techniques and equipment, before a claim could be staked out for radio channels.

Comparative advantages of carrier and space radio communication systems were first studied. After both types had been thoroughly investigated, a joint system was devised in which carrier transmission was to be used for a long-distance communication and the space radio for local and yard service. This (*Continued on page 380*)



In the laboratory car used in the Rock Island's study of railroad radio. Forty-megacycle equipment is installed under the workbench. At the right on the bench is facsimile equipment; at the left, a 157-megacycle receiver.

University or Industry?

The First and Most Important Choice To Be Made in Planning a Research Career; General Principles Applicable in Appraising and Reaching a Decision

BY LAURENCE A. HAWKINS

INDUSTRIAL research, in its relations to the company supporting it and to the public, has been exhaustively discussed in a vast number of published articles, but what may be a more nearly fundamental aspect of the subject has been relatively neglected. The value, both to industry and to the public, of the total research activity in the country depends, first, on the number and ability of the nation's research men and women, and, second, on the placement of each researcher where his aptitudes may have fullest opportunity for development and exercise. The latter depends largely on the judgment shown by the graduate or postgraduate student in selecting the institution in which he is to work. It is hoped that this article may help in the formulation of that judgment.

The first and most important choice which must be made in planning a research career in the physical sciences is between university and industry, and fortunately it is a choice to which certain general principles are applicable. That decision having been made, the selection of a particular university or a particular industrial laboratory will be determined by a variety of special considerations, such as field of interest, personalities, opportunity, conditions of work, location, etc., which vary in weight with the individual research man and do not lend themselves readily to helpful generalizations. The following discussion will therefore be confined to the single question—university or industry?

The amount of salary should not greatly influence the decision. While to some extent colleges and industry are in competition, since both draw their research men from the same source, there should not be a bidding against each other for scientifically trained men. Industry must continue to look to the colleges for its trained scientists; so, if it were to entice all the best men away from the colleges by outbidding them with offers of high salaries, it would be committing a folly similar to that of trying to increase one's income by spending one's capital. Of course it should be borne in mind that the base rate of salaries should be higher in industry than in college, since a college instructor or professor, with vacations and probable opportunities for consulting work, is often able to augment his income very materially in a way not available to the man in industrial research.

Fortunately, there is sufficient diversity in aptitude and inclination among science graduates and postgraduates for some to be happier and more effective in university work than in industry, while others find their greatest satisfaction in an industrial research laboratory. It is to the advantage of both college and industry that each individual find the most congenial environment.

Some men have natural ability as teachers, and teaching appeals to them so strongly that research takes second place in influencing choice. Such men will turn naturally

to the college or university as offering the broadest field for the exercise of their aptitude and the gratification of their ambition. Opportunity for teaching is not wholly lacking, however, from industrial laboratories. Group leaders have the duty and privilege of training their new assistants. Some of the larger industries have come to realize the value of advanced training for their technical men, and have instituted courses in advanced engineering and other subjects. In an industrial laboratory in which advanced science courses are offered, a would-be teacher may enjoy the stimulus and satisfaction provided by a student group of more than ordinary ability and keenness to learn. But even in such laboratories, research comes first, so that those for whom teaching has the greatest allure will probably be happier in college. The following discussion is therefore addressed to those whose predominant desire is for opportunities adequate for the full exercise of whatever aptitudes they may possess for the performance of research.

In seeking such opportunities, the young scientist should first try to decide whether his aptitudes point toward fundamental or applied research. By fundamental research we mean the search for new knowledge, without regard to specific applications. If the results are significant, or "relevant," they justify the work, whether they prove to have practical utility or not. Thus fundamental research differs from applied research, which seeks new facts applicable to the solution of specific problems, and in which utility of the results attained is the measure of success.

Real aptitude for fundamental research is rare. It requires a characteristic which seems to be inborn rather than cultivatable, and which can be indicated by the phrase, "scientific curiosity and imagination." It needs, too, the ability to see the unknown in the familiar. Just as, to the poet, the "primrose by the river's brim" was something more, so to the successful leader in fundamental research the commonplace phenomenon must shout its question. Newton's falling apple and Watt's dancing kettle lid may be apocryphal, but they are none the less veridical. They typify the significance of the commonplace to the mind having natural aptitude for fundamental research.

In applied research these rare qualities are not essential, although they may be helpful. The problem itself provides the objective. Analytical ability, resourcefulness in experiment, keen observation, and perseverance are the requisites for success, and success may vary in degree with the aptitude which the researcher can bring to bear. But without scientific imagination and the ability to see things to which most men are blind, attempts at independent fundamental research are likely to be fruitless. It therefore follows that the number of men who

can achieve at least moderate success in applied research is many times greater than that of those who can hope to achieve real accomplishment in independent fundamental research.

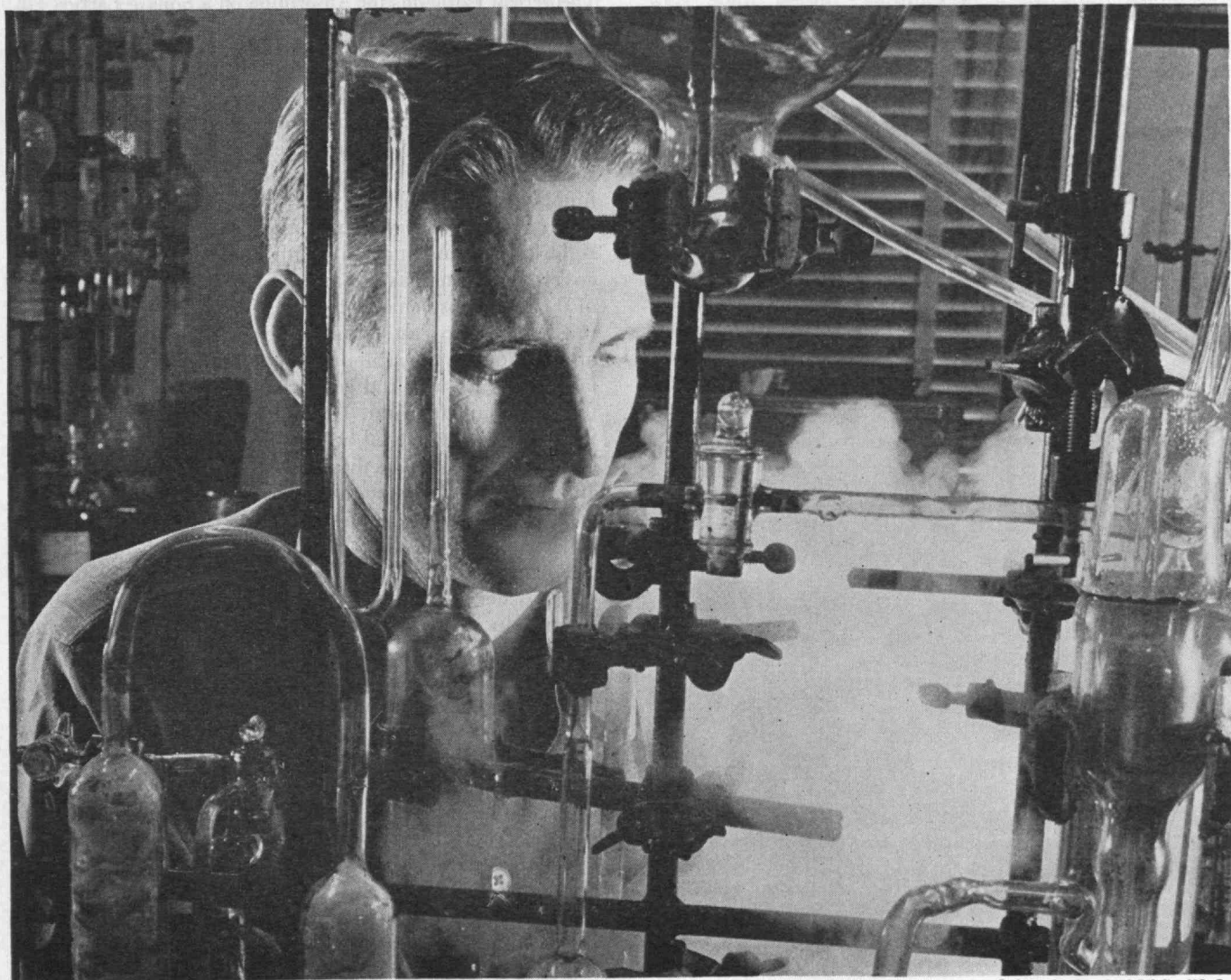
Applied research in the physical sciences is a peculiarly appropriate activity of industry. It is such research that leads to new and better materials, new and better processes, lower manufacturing costs, and better products. In modern competition, any industrial company which neglects applied research is likely to be soon outdistanced by its rivals. Applied research is seldom a suitable activity for colleges, since for best results it should be conducted in close contact with industry. Often proximity to factory process is important, and always close relations are necessary with those who will be responsible for applying the results of the research. If a college establishes such relations with one company, it automatically erects a bar to contacts with other companies in the same field, which is inimical to the relations that should exist between it and industry in general and is therefore prejudicial to its best interests.

Of course, legitimate occasion may arise in a college for applied research in connection with the development of a new instrument or process to demonstrate the utility of a conception springing from the institution's fundamental research, but such occasions are sporadic, so that a scientist intending to make his career in applied research should almost always turn to the industrial laboratory.

Fundamental research is an activity specially appropriate for colleges and universities. Their prime function is the promotion of knowledge, and fundamental research is a most effective means for such promotion. For many industrial laboratories, fundamental research is too much a gamble to permit extensive prosecution of it. It is pioneering. It is always doubtful whether the results will have practical utility, and still more doubtful in what field that utility, if found, will be applicable.

There are, however, a few industrial research laboratories in which the scientist with real ability in fundamental research will find as free a scope and as wide an opportunity as at any college, and frequently with more adequate facilities. Large companies with great diversity of product and of fields of interest can justify much fundamental research, since any new fact is likely to find a useful application somewhere in their diversified fields of activity. The quantity and merit of the scientific results from such laboratories, and the importance of their contributions to the advance of scientific knowledge, are evidenced by the pages of the science journals, and by the large number of awards, including two Nobel prizes, which scientists in industrial laboratories have won.

In the research laboratory of one large industrial company, for example, in a 20-year period, the members of the research staff received 20 honorary doctorates, 22 medals from scientific societies, three cash prizes including one Nobel prize, and five special awards. England, France,



Lofman for Standard Oil Co. (N. J.)

Italy, Sweden, and Japan were represented in the awarding agencies, and in two cases the agency was the government itself.

The fundamental researches in that laboratory were not confined to two or three men. In the five years preceding the war, from 1936 to 1940 inclusive, 144 papers reporting fundamental researches were published by 45 authors, whose average age at the time of publication was 38, with a range from 25 to 69 years. During the same period the number of papers on applied researches numbered 169. Thus, nearly half the publications of this laboratory dealt with fundamental research. The following representative titles will give an idea of the variety of the fields explored:

Transmission of an Electron Density Disturbance along a Positive Column in a Longitudinal Field

Anomalous Dispersion and Dielectric Loss in Polar Polymers

A Kinetic Correlation of Two Reactions Involving Hydrogen Peroxide

Notes on High-Intensity Sound Waves

Two-Dimensional Gases, Liquids and Solids

Built-up Films of Proteins and their Properties

Damping Capacity—Its Variation and Relation to other Physical Properties

Remanence in Single Crystals

The Vapor Pressure of Copper and Iron

Theory and Phenomena of High Current Densities in Low-Pressure Areas

Multiple States in the High-Pressure Discharge

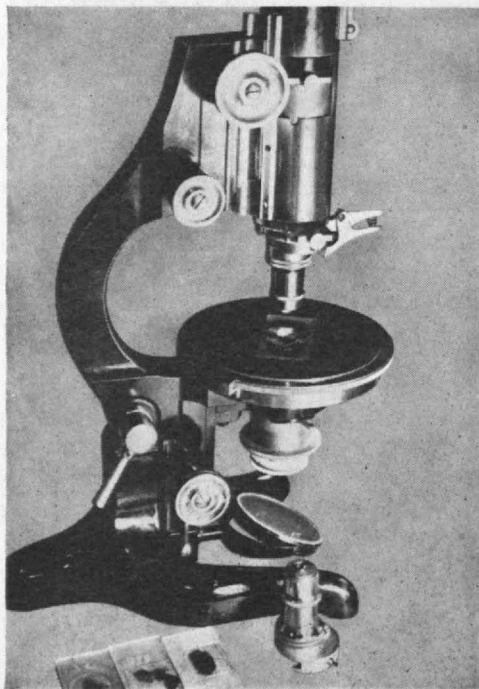
Some Biological Experiments with a Condenser Discharge Type of X-Ray Tube

Interpretation of the Properties of Zinc Sulphide Phosphors

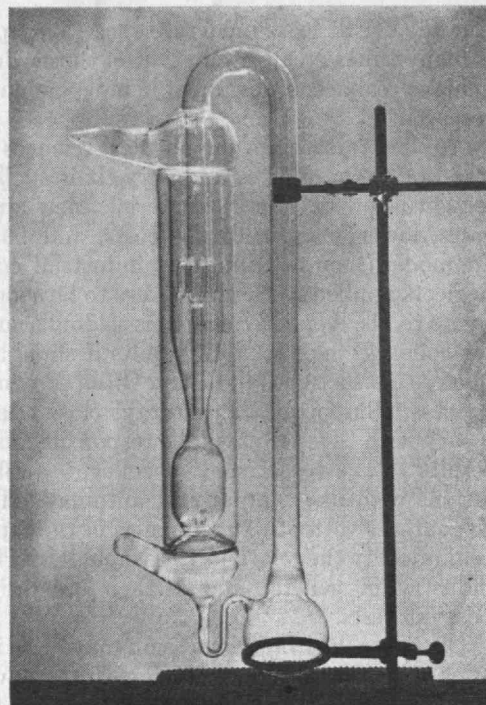
The Structure of the Insulin Molecule

A New Form of the Electromagnetic Energy Equation when Free Charged Particles are Present

Influence of Frequency on the Electro-optical Effect in Colloids



Korth for Carnegie-Illinois Steel Corp.



Boston Museum of Modern Art

High-Frequency Behavior of a Space Charge Rotating in a Magnetic Field

Fission of Separated Isotopes of Uranium

Theoretical Isotherms for Absorption on a Square Lattice

From the foregoing statistics and examples, it should be evident that in some industrial laboratories a man may find full opportunity for the exercise of whatever aptitude for fundamental research he may possess.

Moreover, the man who takes satisfaction in seeing the results of his researches applied in useful concrete form has much greater opportunity for such gratification in a large industrial laboratory than in a college. Some men with the right kind of imagination keenly enjoy taking a newly discovered fact and casting around for practical applications of it. One whose chief interest is in fundamental research itself may enjoy an occasional excursion into the field of applications, while, if he does not, in the large industrial laboratory he will find colleagues able and eager to make the excursion for him. In either case, the close contact with diverse industrial activities and with the live problems they involve facilitates the search for applications and increases the chances of success.

One's personality should influence the decision between college and industry. In most industrial laboratories teamwork is required, and a man unable to take interest in the other fellow's problem or unwilling to lend a hand when help is needed which is in his power to give, may be considered a liability rather than an asset, whatever his ability in research. Even in those laboratories conducting extensive fundamental research, the men engaged in it are expected to lend a sympathetic ear, wise counsel, and sometimes a helping hand, to those in difficulty. Therefore the scientist who prefers to work apart would better seek his opportunity in some college than join the staff of an industrial laboratory.

To the scholarly mind the academic atmosphere is peculiarly congenial, and the contact with other faculty members with diversified interests is pleasurable and stimulating. The freedom of (Continued on page 386)

Science and the Revolution

The Vital Interplay of Engineering and Science with Government Had Its Beginning in War Necessities

By I. BERNARD COHEN

FROM the very beginning of our national history, American science, like American industry and technology, has been closely connected with war. Indeed, the whole history of modern science shows the continuous impact of war upon its development. While American science has played an invaluable part in winning each of the wars in which our nation has been engaged, its development was in turn greatly conditioned by that effort. The Revolution not only marked our birth as a nation; it equally marked the first union of the forces of science and technology with those of government. It was the first occasion of the mutual interplay of forces which has had so decisive an effect upon the history of American science and upon the destiny of America.

The beginning of the Revolution found the American colonies with a burning cause, but with very little more with which to fight. Certainly, they suffered from inadequate industrial resources, in particular those which are required for the manufacture of articles of war. Under the mercantilistic restrictions of the mother country, the several colonies had gained their livelihood and their wealth chiefly from agriculture and maritime commerce. Of industry there was little, and what little there was existed only on sufferance. The production of ordnance was at a low level, and chemical technology was at a still lower one, to the extent that at the time of the Revolution practically no gunpowder was being made in America. The young Army had no medical corps and lacked scientifically trained military engineers. The new Congress was therefore faced with three major scientific or technological problems: the creation of a "war industry" to supply firearms and gunpowder, the organization of a military medical department, and the enlistment of foreign engineers to serve until native Americans could be trained to take their place.

That America was a country rich in metal ores was soon made manifest to the early colonists. The value of the ores was early appreciated by England, which regularly imported them to be smelted and then converted into finished products for sale in America. But by the early part of the Eighteenth Century, the Americans had themselves begun to reduce iron ore and to make useful commodities out of the iron. Around the American bloomeries and furnaces, there grew up rolling mills, slitting mills, foundries, forges, and tool shops, which produced various iron goods for home consumption. In order to protect her own industries, the mother country passed a law in 1750, forbidding the erection in America of slitting mills, rolling mills, tilt hammers, and steel furnaces. Despite the regulations, however, American ironworks continued to function. As a sample of the range of goods produced, we may refer to the advertisement of a New York ironmaster who, in 1765, gave notice that he supplied "flat, square, and bar iron, cart, waggon, chair and sleigh tire, mill

spindles, iron axle trees, cast mill rounds and gudgeons, fullers' plates, forge plates, forge hammers and anvils, pots, kettles, potash kettles, and plates or hearths for pearlash furnaces, sugar and still house grates, fifty-sixes and smaller weights, sash weights, &c." He also manufactured anchors and pig iron.

The distinguished historian, Victor S. Clark, tells us, "At the outbreak of hostilities the colonies already produced enough iron for civil and military requirements. A line of furnaces and forges extended from New Hampshire to South Carolina." Cannon had been cast in America during the early Colonial Wars. Yet the actual conflict had the effect of bringing a sudden change to the colonial ironmakers, and for a time production was drastically curtailed. With the cessation of normal business conditions, many furnaces and forges were abruptly closed.

Although the production of iron fell off rapidly, there were some heroic examples of great iron production. Large furnaces in Connecticut were operated by the Council of Safety, and various expediences were devised



Courtesy of the Massachusetts Historical Society
Thomas Jefferson's certificate of membership in the United States Military Philosophical Society, which, founded in 1794, was the first American scientific society of national scope

to procure labor. In Pennsylvania, some plants were operated with Hessian prisoners who were "leased" from the Continental Congress. One of the great achievements in iron production was the manufacture of the giant chain stretched across the Hudson River from West Point to Constitution Island to prevent the British, who dominated the harbor of New York, from coming up the river. Peter Townsend, master of the Sterling Iron Works, produced the chain in a bare six weeks. It was 500 yards long, made of 750 links. Each link was two feet in length and weighed about 140 pounds. The work was done by day and night operations seven days a week. Helpers were obtained through importing Welsh miners from Pennsylvania and using soldiers who were given special furloughs. When finally assembled, the chain was floated by attached booms and held in place by some 12 tons of anchors. No link ever broke, and no British ship was able to sail past it up the Hudson River.

The supply of clothing during the Revolution presented another technological problem. At that time, carding — a process of combing raw wool and cotton — was done by hand with a pair of "cards." These were squares of leather into which were fixed a large number of bent wire teeth; they were much like the currycombs used on horses. When these cards could no longer be obtained from abroad, women and children undertook the cutting and bending of wire teeth which they then inserted into the leather. A machine devised by one of America's greatest inventive geniuses, Oliver Evans of Philadelphia, soon performed the tedious operation of cutting and bending the teeth. Later, Evans added a device which also inserted and fixed the teeth into the leather frame. This card-making machine was a direct result of the need created by the Revolution. The necessity for card wire caused the state of Connecticut to loan £300 to Nathaniel Miles in order to make wire for card teeth, and, in 1777, Massachusetts offered a bounty of £100 for the first thousand pounds of "good merchantable card wire" made in a water mill of Massachusetts from native American iron.

Another American invention which arose from the exigencies of the Revolution was a process for making cold cut nails. The shortage of labor having cut down the production of nails and tacks, it occurred to an enterprising Rhode Island mechanic named Orziel Wilkinson that he might cut them from plates with heavy shears. These were the first cold cut nails ever to have been made. "I think in 1779," writes Wilkinson's son, "my father made a small pinch press, with different sized impressions, placed on an oak log, with a stirrup for the foot, and set me astraddle on the log, to heading nails, which were cut with common shears. He cut the points off of plates drawn by a trip hammer. This was the commencement, in the world, of making nails from cold iron." From Wilkinson's beginning, according to Clark, "developed the cut-nail industry, soon to become one of the most important as well as the most characteristic branches of metal manufacture in America."

The problem of supplying rifles was not so serious as that of heavy ordnance. The frontiersmen of America had long been supplying their own firearms. Before the middle of the Eighteenth Century, a single Massachusetts maker had been able to fill an order from the provincial government for 500 muskets. In Lancaster was made the famous "Pennsylvania rifle," the best gun in existence at the time of the Revolution — so good that it enabled the

Pennsylvania backwoodsmen to outshoot any British or Hessian soldier. So deadly was its precision that Howe wrote home about the "terrible guns of the rebels," and supposedly offered a reward for the capture of a rifleman "complete with shooting irons."

But the Colonies were in a very precarious position regarding their supply of gunpowder. At the beginning of the war, the supply of gunpowder, from private and seized Crown stores, amounted to some 80,000 pounds. Half of this was sent to Washington in Cambridge, in response to his urgent appeals. Unfortunately, a good portion of the quantity sent to him was expended recklessly before it arrived, and, by the end of August, 1775, Washington had no powder with which to employ his artillery. On Christmas Day of that year he wrote: "Our want of powder is inconceivable. A daily waste and no supply administers a gloomy prospect." Three weeks later not an ounce remained in his magazines. Eventually a small stock arrived, and Washington was able to seize Dorchester Heights, from which he commanded both the town of Boston and the British fleet in the harbor.

Such being the conditions, the Second Continental Congress moved with celerity to increase the supply of gunpowder by manufacture and import. The state governments undertook the supervision of manufacture, in many cases under the direction of the council of public safety. Hopes ran high at first. Congress sent out agents to extract "nitrous salt" from the earthen floors of the buildings and yards where tobacco was inspected or stored, but nothing ever came of this project. Congress caused to be printed various "systems" of manufacturing processes, which were sent to the several state governments, which in turn offered financial support and liberal bounties for the production of saltpeter, or powder, or both.

Pennsylvania, Massachusetts, and New York produced fairly large quantities of gunpowder. In New York, the Committee of Safety issued a 38-page pamphlet urging all people to save nitrogenous material and recommending various means of making powder. The most important of these was the method used at the provincial saltpeter works at Philadelphia and was based on European methods revised by Dr. Benjamin Rush, the eminent Philadelphia physician.

The Provincial Congress of Massachusetts had, in a resolution of December, 1774, recommended the restoration of one or more of the abandoned powder mills or the erection of new ones. In November, 1775, Paul Revere was sent to Philadelphia with instructions "to obtain an exact plan of the best constructed powder mill, the quantity of powder that may be made in one day in said mill, the expense of the powder mill, and whether a skilled powder-maker can be obtained." A mill was eventually constructed by the state at Canton and operated so successfully that in September, 1776, there were stored there some 38,000 pounds of powder and 34,000 pounds of saltpeter.

Despite all these efforts, the results were far from encouraging. Almost all of the 13 states took steps to promote the manufacture of gunpowder. Yet the total production from native saltpeter during the first two and a half years of the Revolution was only 115,000 pounds. During the same period, four states — Massachusetts, New Hampshire, Pennsylvania, and Maryland — each imported more than that amount (*Continued on page 374*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE



M.I.T. Photo

President Compton and Joseph Abbott, President of the Sugar Research Foundation, at the dinner at which establishment of awards was announced.

For Sucrose Research

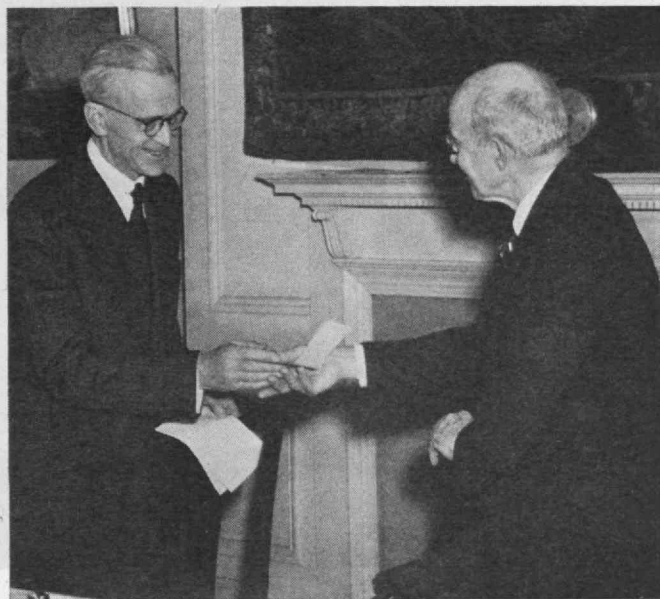
ESTABLISHMENT by the Sugar Research Foundation, Inc., of a series of research prizes totaling \$45,000 which will be awarded to scientists for the discovery of new uses for sugar in medicine, the arts, and industry was announced on March 3 at a dinner given in Boston for members and directors of the foundation by President Compton.

Announcement of the prizes was made by Robert C. Hockett, the foundation's scientific director, who is on leave of absence from the Institute's Department of Chemistry. Dr. Compton praised the sugar industry for creating the foundation to promote research and expressed the hope that other great industries would embark on similar broad research programs.

"This occasion," said Dr. Compton, "leads me to remark briefly on two vitally important aspects of scientific work: in retrospect to consider the uses of scientific man power in the last few years, and in prospect to survey the opportunities of the technical groups operating for the public good under the sponsorship of organizations like the Sugar Research Foundation.

"For nearly half a decade, the energies of practically all the scientific talent of the world have been directed toward the development of instrumentalities of war. None of us will quarrel with the thesis that this activity has been necessary to re-establish the social and political freedom of the world, and while many of the researches will have peacetime applications, their immediate purposes have not been constructive.

"The apparent necessity of giving the combat branches of the armed services first priority on man power has led to some diversion of technical personnel into fields unre-



M.I.T. Photo

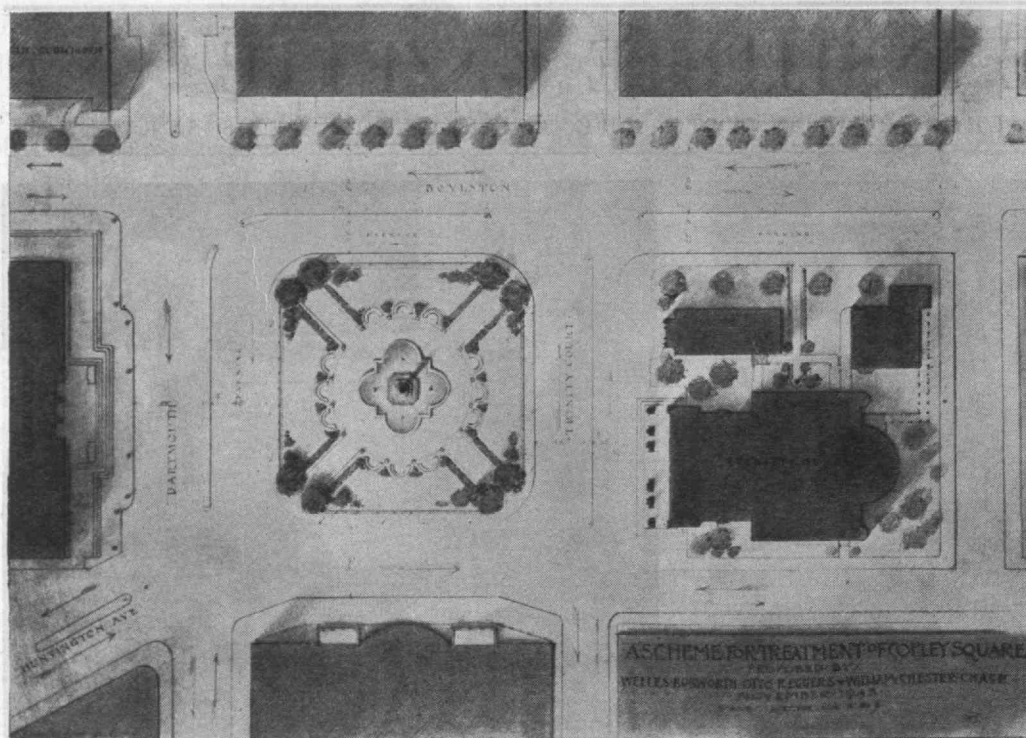
Frank B. Jewett, '03, President of the National Academy of Sciences, accepts from Mr. Abbott a check to finance the Sugar Research prizes.

lated to their training and experience. In dealing with a problem of such magnitude in a democracy, some confusion is bound to result in attempting to utilize all man power effectively, but full recognition has not always been given to the fact that technical advantage in this war ranks on equal terms with superiority in tactical and combat man power. Our enemies and allies alike have recognized this fact. Arbitrary decisions to draft all men in any age group, however young, will yield the required number of soldiers, but it does not necessarily follow that we will win the war earlier by such tactics.

"The government has recognized to a large extent the essentiality of technically trained men in setting up the regulations governing selective service. There is ample evidence to indicate that the need for these same men will be just as great in the immediate postwar period. Yet the regulations for releasing men from the armed services after the war provide generally for their release in the order in which they were inducted. If this policy is carried out with respect to technical personnel recently inducted into the armed services, postwar needs will not be adequately met.

"Looking now to the postwar years, I see practically unlimited opportunities for scientists and engineers to carry on constructive researches of fundamental importance to the improvement of the standards of living. The application to peacetime use of instruments developed during the war, plus the backlog of normal research, offers unprecedented opportunity for technical personnel."

Frank B. Jewett, '03, President of the National Academy of Sciences and former Vice-president of the American Telephone and Telegraph Company, and Joseph Abbott, President of the foundation, were other speakers at the gathering of 75 leaders of the sugar industry and prominent scientists.



A new plan for Copley Square in Boston, prepared by Welles Bosworth, '89, and Otto R. Eggers, with William Chester Chase, '86, associated. Squaring up the area occupied by Trinity Church, opening a new street between Boylston and Newbury streets, and placing a park in the center of the square, the plan reveals new potentialities of the familiar area.

Peter A. Juley and Son

In announcing the establishment of the awards, Dr. Hockett said that the foundation had created four intermediate annual prizes of \$5,000 each and a grand prize of \$25,000.

On March 1 of 1946 and in each of the three succeeding years, an intermediate prize of \$5,000 will be given for the most important discovery or invention. On March 1, 1950, a grand prize of \$25,000 will be given for the most important discovery or invention during the preceding five-year period. The awards will be made, and the project administered, by the National Academy of Sciences through its National Science Fund. Mr. Abbott presented Dr. Jewett with a check for \$50,000 to finance the awards.

In discussing the purpose of the awards, Dr. Hockett said that among the domesticated plants that convert sunlight into edible carbohydrate the sugar cane and sugar beet are outstanding.

"Our society is therefore obligated," he added, "to estimate fully the importance of sugar as a currently available store of solar energy. We hold it consistent with the spirit and needs of the postwar era to promote investigation which will acquaint us more completely with the functions and behavior of sugar in the human and animal body. As a food, sugar must be fully evaluated, its virtues determined, its defects apprehended, recognized, and overcome or compensated. As an organic compound, its present and potential utility in medicine, and in every art, industry, or technology must be explored. In order that such explorations shall hold the maximum practical value, the disaccharide sucrose (sugar) itself, as it reaches the hand of man from plant sources, must be the basis of our research."

Mr. Abbott said that the awards were intended to stimulate the curiosity of scientists everywhere in their search for the truth about sugar and pointed out that the Sugar Research prizes supplement other fundamental research work which the foundation has encouraged by establishment of a laboratory at the Institute and grants-in-aid for work in many university laboratories.

"As a war measure," Mr. Abbott concluded, "it has been necessary for our government to mobilize all our resources and research. In the days ahead private industry must again assume its full share of this responsibility and leadership. The sugar industry as a part of the American system pledges itself to support the search for new knowledge through fundamental research and to co-operate in the use of such knowledge to the end that the future may provide a more abundant life for all."

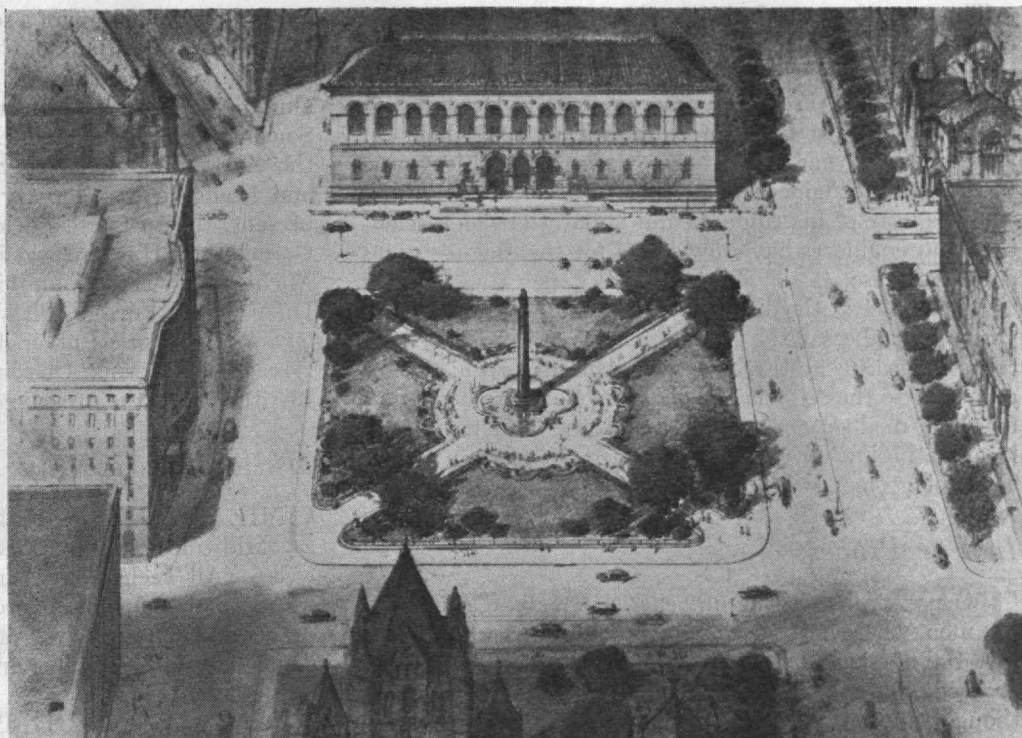
In accepting the check upon behalf of the National Academy and the National Science Fund Dr. Jewett said, "The prizes are tangible evidence of a statesmanlike and forward-looking point of view on the part of the Sugar Research Foundation. Choice of the academy and the fund as the administrators is equally tangible evidence of the position of confidence which the academy and its agencies have attained as responsible national organizations in the field of science."

Dr. Jewett recalled that 25 years ago he had pointed out that a definite upper limit on hydroelectric power and increasing inroads on coal and oil supplies which nature had stored up but was not replenishing, foreshadowed the day when progress would stop and retrograde unless science found new sources to supply the energy needed.

"It seemed to me then, as it does still," Dr. Jewett added, "that the signposts all pointed toward utilization of the essentially inexhaustible supply of solar energy. Further, that they pointed toward its use through the mechanism of growing things and particularly things growing in the sub-tropical and tropical regions. Here as nowhere else all conditions for continuous high efficiency of transformation are at a maximum."

"Then as now, I envisioned concentrated energy—liquid or solid—in packaged form being transported to distant places of utilization to take the place of vanishing supplies of similar energy derived from this same solar source over incredible eons in ages long past. If this is the goal we are headed for, the reaching of it will involve an incredible amount of scientific effort. It will be the effort

This perspective view of the Bosworth-Eggers-Chase solution for the problem of Boston's Copley Square looks from Trinity Church toward the Public Library. Traffic is routed one way around the central park. Ample parking areas are provided, separated by islands from the traffic lanes. The gable of a projected chapel for Trinity Church may be seen at lower right center of the drawing.



Peter A. Juley and Son

of biologists, chemists, physicists, engineers, and all the other technologists, but there seem to be no insurmountable obstacles in the way. It is because of these reasons that I have a particular interest in these sugar prizes and the results that will come from them."

For Copley Square

PERHAPS because it was for many years close neighbor of "The Tech on Boylston Street," perhaps because it is intrinsically fascinating, Boston's Copley Square has long attracted the ingenuity of Technology architects. Past volumes of *The Review* present proposals for the improvement of the square which have come from the drafting boards of Alumni when, as happens at intervals, the imminence of need for a memorial or the emergence of the spirit of civic improvement brought the unrealized potentialities of the square into active minds.

Now from the architect of the Institute in Cambridge, Welles Bosworth, '89, and Otto R. Eggers, with William C. Chase, '86, associated, comes a new plan for the square. The plan and a perspective view of the square as it would be rehabilitated thereby are reproduced on these pages. The scheme proposed by the three architects argues that once the idea of rotary traffic is accepted, solution of the problem whether for circulation, for parking spaces, or for beauty becomes a very simple matter. On the theory that postwar opportunities might suggest a monumental building for the north side of the square, they assume the opening of a short street through to Newbury Street to cut the long dimension from Dartmouth to Clarendon streets and to center the monumental structure on the axis of the hotel opposite, thus better balancing the square.

The chief point of interest of the Bosworth-Eggers-Chase project is its recognition that pedestrians crossing the square will desire to do so diagonally — from Huntington Avenue to Clarendon and Boylston streets, or vice versa. The chief lines of circulation in the design therefore are shown on the diagonal, with the further great

advantage of rendering unobjectionable, if not unnoticeable, the slight "off-axis" of the central monumental feature with the center of the Public Library.

"This would be true," Mr. Bosworth pointed out, in commenting on the project for *The Review*, "upon leaving the library entrance, where the picturesque grouping of Trinity Church and the projected new chapel filling out that side of the square do not demand accent on the center, and it would be equally true in looking from the church toward the library, where nothing would mark the axis to the pedestrian."

The central monument included in the new plan, the architects remark, may be anything desired, whether war memorial or fountain, but should be agreeable to study from the park benches and sufficiently important to be in proportion to the library as well as to the size of the square. Not being on the center of any prolonged vista, however, it need not be very large. The benches about it are shown separated into curved exedrae to give more privacy to small groups or individuals contemplating from them the fountains and floral massings which should compose the base of the central motif.

Correction, Please

ALUMNI Day plans for 1945 embody yet another change from those of past years, so that announcement made last month in *The Review* should be revised. Alumni Day participation on June 23 will consist of attendance by Alumni at the Class Day exercises of the Class of 6-45, and of an Alumni Day banquet that evening in the Hotel Statler, at which members of the graduating class will be guests of Alumni. But the entire affair must of necessity be a local one; notices will be sent only to Alumni in the Boston Postal District. This limitation has been set down by the Alumni Day committee in cooperation with the efforts of the Office of Defense Transportation to lessen loads on railroads and other intercity systems.

Thus wartime needs bring about a second sweeping change in the pattern of Technology's traditional reunion celebration. The notable conferences and exhibits which were a feature of the program prior to December 7, 1941, ended with those of Alumni Day 1941, held on June 9 that year, when the conference subject was "Science and Engineering as Allies of Medicine," and the exhibits were of instruments and apparatus which scientists and engineers have developed for the diagnosis and cure of disease.

Attendance at the dinner on the evening of June 23 this year by members of the graduating class is looked forward to as a parting gesture by older Alumni to the newest additions to the Association on the eve of their departure for the armed services. Thus though the dinner will be a local gathering only, its importance as a bond among Technology men will be preserved.

In Far Places

TO paraphrase a line of *Sons of M.I.T.*, Technology men, wherever they may be, maintain with the Institute the bonds which the song memorializes. As the war proceeds, more varied become the regions from which in thought and letter they come back to Technology. Thus from Headquarters, India Burma Air Service Command, Brigadier General Stuart C. Godfrey, '07, Air Engineer, writes President Compton:

It was of much interest to attend yesterday a meeting of the M.I.T. Association of India, at which were present about 15 Indians plus half a dozen United States Army officers, all of whom had attended M.I.T. The war seems to have given an impetus to interest in M.I.T. over here, as India has seen concrete evidence of our mechanical and technical ability, and Dr. Pandya [Anant Hiralal Pandya, '31] told me that far more Indians wish to attend M.I.T. than can be accepted. There is also a plan (which I hope to hear more about) to establish a new scientific school modeled after M.I.T. My staff includes other M.I.T. men, and we are trying to give such time as our crowded schedule permits to encourage and assist some of these activities — the Indians seem so eager for our interest and help.

While I am somewhat handicapped in serving as a member of the Visiting Committee for Civil Engineering, I can perhaps function in absentia to a slight extent, and have had some correspondence with Professor Wilbur ['26] on M.I.T. matters. The greater emphasis now being placed in the Course I curriculum on soil mechanics is desirable, for in moving millions of tons of earth all over the world, we military engineers have found much need for a more thorough knowledge of this subject. I have also enjoyed hearing from Ed Moreland ['07], in Washington.

You wrote me last summer of your admiration for Pat Casey's engineering construction in the Southwest Pacific. I have kept in touch with him and the engineering developments in that theater, which have continued to make outstanding progress. Many of the aviation engineer battalions that Casey has, were organized and trained under my supervision. Our activities here have been on a smaller scale, but there have been no dull moments. *Civil Engineering* in January and February published an article of mine, descriptive of this theater.

The Technology Review reaches us over here, and in the December number I enjoyed your paper on "To Train Men Liberally." I feel that in the span between my class at M.I.T. and that of my son Bob, great progress has been made in appreciation of the fact that it is not enough to train good technicians.

And from Headquarters, Services of Supply, China Theater, comes word to The Review of the formation of a University Club in Kunming, China, at a meeting of

more than 150 alumni of a score of American Universities. Gathering at the Bank of China Villa, the group were under the chairmanship of Shu Ching-chi, a Michigan alumnus, and were addressed by Y. C. Mei, President of Southwestern Associated Universities. About a third of those attending were Army personnel from nearby bases and headquarters. Twenty Alumni of the M.I.T. were present, the Institute's delegation being topped only by Cornell's 22. Harvard was represented by 18 alumni and Michigan by 14. Columbia, Yale, Princeton, Illinois, Duke, Iowa, Purdue, Pittsburgh, Kentucky, Ohio Wesleyan, New York University, Lehigh, Wisconsin, Pennsylvania, California, Oberlin, and Worcester Polytechnic Institute were the other institutions represented.

Midwinter Meeting

THE interest of Greater Boston Technology men in the Midwinter Alumni Meeting on February 26 augurs well for All-Technology Alumni gatherings after the war. More than 800 alumni crowded Walker Memorial for dinner and a program which included an address by President Compton and talks on several interesting technical developments of the war.

Raymond Stevens, '17, President of the Alumni Association, presided at the meeting and expressed special pleasure at the large attendance. After Dr. Compton's address Mr. Stevens introduced John T. Rule, '21, Associate Professor of Drawing and Descriptive Geometry, who gave an illustrated talk on the use of three-dimensional vectographs as a technique of training and for reconnaissance work in the war.

Commander D. L. Hibbard, '29, U.S.N.R., gave a demonstration with slides of the various devices used by the navy for training the crews of its aircraft. These devices were developed under the direction of Captain Luis De-Florez, '11, who is in charge of the Special Devices Division, Bureau of Aeronautics.

Larcom Randall, '21, was chairman of the Committee on Assemblies which arranged this very successful midwinter meeting.

Visiting Committee Report

THE Committee on the Medical Department* met December 12, at the Homberg Memorial Infirmary. The Committee found the Infirmary centrally situated in the main building and occupying sections of three floors, including several wards with a total of 39 beds, some of which were in single rooms and others in small wards containing four to six beds. The Committee also inspected the kitchen, operating room, and clinics, and is gratified to report that it regards them as in admirable condition, and in most respects entirely adequate to the requirements. It was reported that the recommendation of last year's Committee for screens for certain of the room windows had been taken cognizance of and that the screens had been ordered.

The Committee also takes pleasure in complimenting the Institute upon the staff and its work, not only of the doctors, but also of the nurses and the employees. Their work merits very high praise.

The attention of the Committee was called to the fact that many of the employees and some members of the Faculty and students seek (Concluded on page 398)

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SCIENCE AND THE REVOLUTION

(Continued from page 368)

from France. During this period, the Colonies made some 698,000 pounds of gunpowder from imported saltpeter, but the state of Pennsylvania alone imported some 605,000 pounds of gunpowder during this time. Altogether, the American mills produced about 815,000 pounds as compared to a total import of 1,454,210 pounds during the first two and a half years of the war. Less than 10 per cent of the total powder used would have been available but for the aid of French merchants, who sent supplies of powder or saltpeter to the West Indies to be exchanged for colonial products. Over one hundred ships sailed from France with military stores for the Americans, and but for this help the Revolution would surely have collapsed long before the Saratoga campaign.

At the very beginning of the Revolution, the technical handicaps of the new army were brought to the attention of Congress by the man who understood the problem most clearly. On July 3, 1775, in Cambridge, George Washington had taken his place as "general and Commander in Chief of the Army of the United Colonies." Seven days later he dispatched a detailed letter to the "President of Congress," describing the state of the Army and its most pressing needs. Great stress was laid upon the "Want of Engineers to construct proper Works and direct the Men," and upon the need of procuring ordnance and gunpowder.

Later, in the same letter, General Washington returned to the subject of scientifically trained engineers: "In a former part of my Letter I mentioned the want of Engineers. I can hardly express the Disappointment I have experienced on this Subject; the Skill of those we have being very imperfect and confined to the mere manual exercise of cannon, whereas the war in which we are engaged, requires a Knowledge comprehending the Duties of the Field and Fortifications."

Washington knew the value of scientific training and wrote of "the limited and contracted knowledge which any of us has in Military Matters" as standing "in very little stead," and being "greatly over-Balanced by sound judgment, and some knowledge of men and Books."

To Benjamin Franklin, as minister plenipotentiary of the United Colonies, was assigned the duty of engaging the services of some French engineers. When he arrived in Paris in December, 1776, Franklin immediately made known to the minister of war, the Comte de Saint-Germain, the desire of Congress to "secure skilled engineers, not exceeding four." The French, though not yet arrived at the stage of openly supporting the American cause, were happy enough to assist in the embarrassment of their rivals, the British. Four of their best army engineers were detailed to service under General Washington. These scientifically trained military engineers helped Washington to plan and supervise the construction of the fortified encampment at Valley Forge, and they were his constant advisers right down to the final siege and surrender at Yorktown.

Washington's experience convinced him of the necessity of a scientific school, to be the United States Military Academy. Washington himself, with Generals Lee and Huntington, and Colonel Pickering, selected the site at historic West Point, and in 1794 the academy was for-

mally established by an act of Congress. It is seldom recognized that the academy was our first national scientific institution. It was established primarily for the training of Army engineers. In the same year, the United States Military Philosophical Society was founded, with the whole Army Engineer Corps as a membership nucleus. This organization, the first national American scientific society, was devoted to "the collecting and disseminating of military science," and was interested in the arts and sciences as applied in the arts of peace and the arts of war. Its name indicates that its founders had learned the lesson taught by the French engineers, which was that the science of military engineering depends upon the cultivation of "natural philosophy," that is, pure science.

Such brave beginnings were, however, doomed to at least temporary failure. The Military Philosophical Society, which came to include civilians as well as Army and Navy personnel, lasted only ten years. And the academy itself maintained a continuous existence only under the greatest vicissitudes of fortune. Within a year of its establishment, its building, books, and apparatus were destroyed by fire, and it was suspended as a government institution. It continued in a semiprivate way as a training center for cadets until 1802, when Thomas Jefferson, acting upon the recommendation of the Secretary of War, reinvoked the act of '94. It was ordered that a United States Corps of Engineers and a regular military academy be established on a permanent and expanded basis in order to satisfy the "want," which, Jefferson told Congress, "is already sensibly felt, and will be increased with the enlargement of our plans of military preparation."

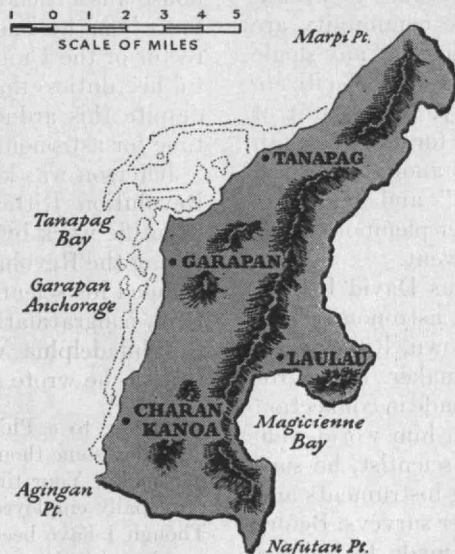
But even Jefferson's measures did not prove sufficient. Once again the Military Academy was allowed to decline. General Jonathan Williams, grandnephew of Benjamin Franklin and a vice-president of the American Philosophical Society, was chief of engineers in addition to being superintendent of the academy. In the former capacity, he was so busy supervising the construction and repair of our principal harbor defenses that he was unable to devote sufficient time and attention to the academy. The students were few and the instructors, for the most part, incompetent. Added to these difficulties was the hostility of William Eustis, President Madison's Secretary of War, who would not issue the necessary orders directing appointees to report for duty and who dispersed both the cadets and instructors already at West Point to duty elsewhere. On the day of the declaration of the War of 1812, the academy stood empty. Congress was impelled to hasty action and immediately reorganized the academy. From then on, the academy never failed to function efficiently.

Throughout the Revolution, America's leading man of science, Benjamin Franklin, devoted all his energies to the political sphere. In Franklin's own mind, the relations between his scientific activities and his political career were clearly marked. For his own part, he would have preferred to remain a "natural philosopher," but he felt that the pursuit of science must be secondary to the national or civic welfare. Long before he became active in the public affairs of his own city, Philadelphia, much less the affairs of the nation, he wrote to a friend in New York: "Had Newton been pilot but of a single common ship, the finest of his discoveries would scarce have ex-

(Continued on page 376)

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SCIENCE AND THE REVOLUTION

(Continued from page 374)

cused, or atoned for his abandoning the helm one hour in time of danger; how much less if she carried the Fate of the Commonwealth."

These lines contain the guiding principle of his life. According to his standards, the scientist was, above all, simply a member of the community. Socially, he was like every other citizen; he was entitled to no special privileges, no exemptions from service. According to Franklin's credo, moreover, the needs of the community are always of greater importance than the needs of any single individual, be he scientist or any other kind of citizen. In time of national or civic emergency, the pursuit of pure science (the search after knowledge for its own sake), however interesting it may be, is but another cultural luxury to be given its "due weight" and no more. America needed Franklin as her minister plenipotentiary at the court of France, and thither he went.

Second only to Franklin, perhaps, was David Rittenhouse, the Philadelphia mathematician, astronomer, and instrument maker. Born near Germantown, Rittenhouse was self-educated and became a clockmaker. His astronomical observations, especially those made in connection with the transit of Venus in 1769, won him world-wide fame. Too poor to be a "gentleman" scientist, he supported himself by making and repairing instruments and by public services such as canal and river surveys. Before the Revolution an attempt had been made to build a public observatory which Rittenhouse would direct, in order that he might give his full time to science. The Revolution needed men of Rittenhouse's ability, and he

became engineer of the Committee of Public Safety early in 1775. He supervised the casting of cannon and the manufacture of gunpowder; he experimented on rifling cannon and on musket balls, and acted as a one-man scientific advisory board. To "beat priorities," he substituted iron for the lead clock weights in Philadelphia and thereby secured a supply of lead for the manufacture of bullets.

A member of the American Philosophical Society, which was suspended during the Revolution, Rittenhouse was a friend of Franklin and Jefferson. Washington, for whom he made spectacles, appointed him first director of the United States Mint. The Revolution added to his duties that of treasurer of Pennsylvania but, despite this arduous program, Rittenhouse found some time for astronomical observations.

Jefferson was keenly aware of the fact that before the Revolution Rittenhouse had been handicapped in his scientific work by the need of earning a living, and that during the Revolution his service to the cause had all but stopped his scientific research. In a letter dated July 19, 1778, congratulating his astronomer friend on his return to Philadelphia which had just been freed from the British, he wrote as follows:

Writing to a Philosopher, I may hope to be pardoned for intruding some thoughts of my own, though they relate to him personally. Your time for two years past has, I believe, been principally employed in the civil government of your country. Though I have been aware of the authority our cause would acquire with the world from its being known that Yourself and Doctor Franklin were zealous friends to it, and am myself duly impressed with a sense of the arduousness of government, and

(Concluded on page 378)



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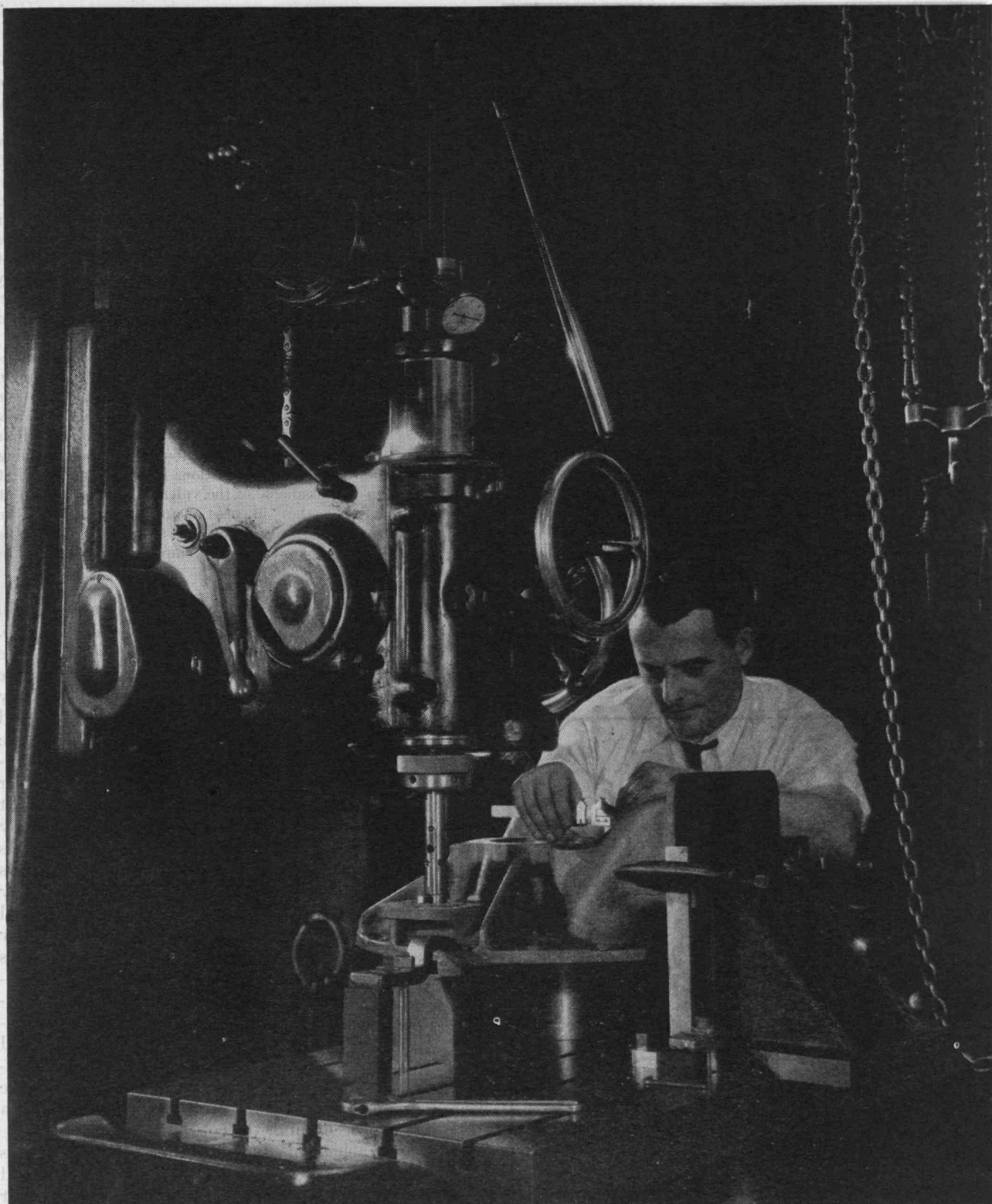
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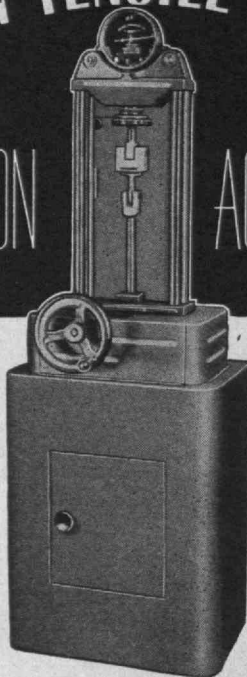
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SCIENCE AND THE REVOLUTION

(Concluded from page 376)

the obligation those are under who conduct it; yet I am also satisfied there is an order of geniuses above that obligation, and therefore exempted from it.

Nobody can conceive that nature ever intended to throw away a Newton upon the occupations of a crown. It would have been a prodigality for which even the conduct of Providence might have been arraigned, had he been by birth annexed to what was so far below him. Co-operating with nature in her ordinary economy, we should dispose of and employ the geniuses of men according to their several orders and degrees. I doubt not there are in your country [state; i.e. Pennsylvania] many persons equal to the task of conducting government; but you should consider that the world has but one Rittenhouse, and that it never had one before. . . .

Are those powers then, which, being intended for the erudition of the world, are, like air and light, the world's common property, to be taken from their proper pursuit to do the commonplace drudgery of governing a single state, a work which may be executed by men of an ordinary stature, such as are always and everywhere to be found? Without having ascended Mount Sinai for inspiration, I can pronounce that the precept, in the decalogue of the vulgar, that they shall not make to themselves the "likeness of anything that is in the heavens above" is reversed for you, and that you will fulfill the highest purposes of your creation by employing yourself in the perpetual breach of that inhibition.*

Jefferson's active interest in useful science as well as in natural philosophy or pure science was revealed in 1785, by his interest in the mechanical work being done by the French chemist, Nicolas Leblanc. Leblanc later became world famous when, in 1790, he won the prize offered by the Académie des Sciences in Paris for the best method of manufacturing soda. The Leblanc process, as it came to be known, made possible for the first time the manufacture of soda on an industrial scale. But in the year when Jefferson visited his workshop Leblanc had just revolutionized the general process of manufacturing by introducing standardization, the *sine qua non* of mass production. In that year he had begun producing muskets with interchangeable parts, an innovation described by Lewis Mumford as "the type of all future mechanical design." Until that time, there had been no uniformity at all, not even in such minor parts or elements as screws or threads. Some years later, in 1798, Eli Whitney, supported by Vice-president Jefferson, was offered a contract from the United States Government for the manufacture of 10,000 muskets, all with interchangeable, and therefore readily replaceable, parts. Very likely, Whitney's introduction of standardization of manufacture was of greater significance in the development of America than was his invention of the cotton gin.

Whitney's achievements, like those of Oliver Evans and Robert Fulton, were, in a sense, typical of the period from the Revolution to the War of 1812. Like all other branches of the national life, American science and American technology and invention were groping their way and taking their first independent steps. In the period that followed, American science came to the first stage of maturity.

*Jefferson refers here to the famous orrery which Rittenhouse made for the colony of Pennsylvania. In his *Notes on the State of Virginia*, Jefferson wrote of Rittenhouse's orrery in these words: "He has not indeed made a world; but he has by imitation approached nearer its Maker than any man who has lived from the creation to this day."

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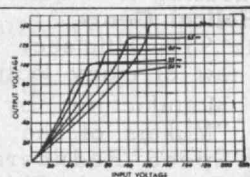
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RADIO FOR RAILROADS

(Continued from page 363)

plan has the advantage of the low cost long-distance transmission which may be accomplished through the use of wayside wires as part of a magnetic transformer in which the secondary may be the locomotive or caboose. Communication may exist between the wayside wires and the caboose anywhere on a 150-mile span with this system.

Space radio was to be used for yard systems and terminal operation where no wayside wires are within a relatively short distance of the locomotive or caboose, where yards may be a mile or two miles wide, and five or six miles long. Radio signals broadcast in all directions from a central point would easily cover two or three yards working in the same locale with no disturbance because of proximity to wires. This combined carrier and radio system was the original plan devised by the Rock Island and suggested to the Federal Communications Commission.

Further investigation later in 1944 proved that although the carrier system was excellent for long-distance transmission, interference with other railroads using the carrier system appeared. To cite an example: A 120-car freight train equipped with the carrier system was more than 40 miles from the Kansas City yards when train orders transmitted by the Kansas City Southern were received and interfered with signals from the Rock Island Lines. If there had been three or four railroads operating in the same district, all would have received the train orders

issued by the Kansas City Southern. Since a very limited number of channels were available it was believed best, therefore, to drop the induction system in favor of a complete space radio system in which directional antennas would tend to guide radiation along the bounds of the railroad road bed. Another important advantage appeared in favor of space radio. If wires were down or had more than two or three breaks, the induction system would be out of service. The space radio system would still have its normal operating characteristics, and would be relatively little affected by sleet storms, floods, and similar emergencies.

The next comparison, between frequency modulation and amplitude modulation, covered the frequency range of from 28 megacycles to 3,000 megacycles for radio systems and from 70 kilocycles to 175 kilocycles for the induction system. The strength of frequency modulation signals remained constant as the distance increased, while in amplitude modulation the same result could be obtained only by an exceptional automatic volume control circuit. Results of these tests indicated that frequency modulation was preferable for railroad communication.

As the frequency of the radio waves was increased, atmospheric noise decreased. At 40 megacycles atmospheric noise was so great that amplitude modulation was impractical but at 100 megacycles the noise was practically nil. However, another difficulty arose. When the mobile field laboratory in which research was done approached or passed through a town or a region with many buildings, a

(Continued on page 382)

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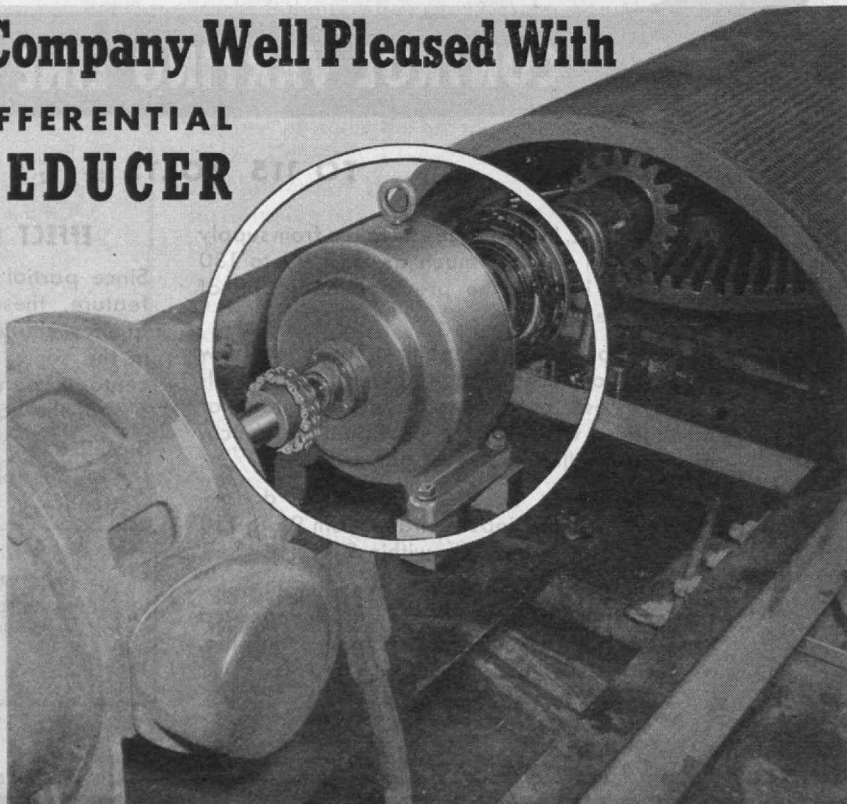
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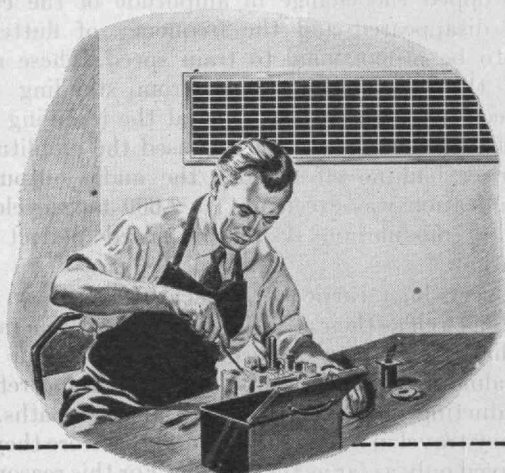
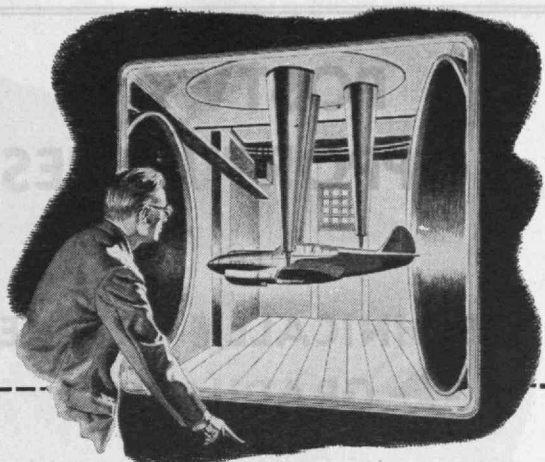


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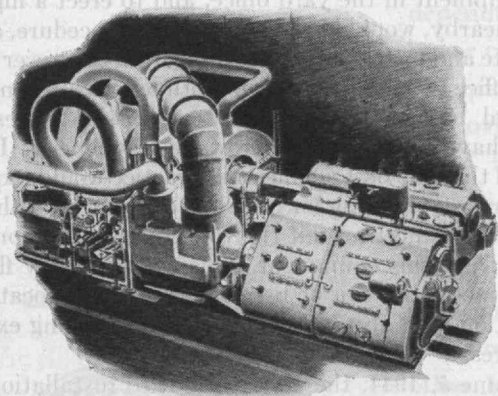


In a factory a **WORKER** assembles delicate bomb-sight parts in air made dust-free by the **Precipitron*** electrostatic air cleaner.

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In a penicillin plant a **SCIENTIST** uses a **Sterilamp*** bactericidal tube to protect this life-saving drug from contamination by air-borne bacteria.

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PROCTER & GAMBLE
INDUSTRIAL RELATIONS DIVISION
• CINCINNATI 17, OHIO •

RADIO FOR RAILROADS

(Continued from page 380)

definite variation in signal strength or flutter effect was present in the amplitude-modulated signals received on the train. At 300 megacycles this effect became annoying, while at 3,000 megacycles communication from a moving point, or between two points, was practically impossible because of flutter.

Upon a closer examination it was found that this flutter effect was caused by a change in amplitude of the carrier as a result of the establishment of standing waves or of multipath reception. A recorder was set up to record the current of the limiter in the train's receiver. When the train stopped the change in amplitude of the current limiter disappeared and the frequency of flutter was found to be proportional to train speed. These results proved that the flutter results from standing waves (produced by reflections) existing at the receiving point. When frequency-modulation was used the amplitude of the carrier had no effect upon the audio output and communication was excellent. At 2,600 megacycles the frequency modulation system produced perfect communication.

The very high carrier frequencies have their shortcomings as well as their advantages. They act in a manner somewhat similar to a beam of light. Waves can be directed almost at will and may be deflected and reflected by conducting objects encountered in their paths. Further, they travel in a straight line, and therefore they may be received only as far as the horizon. For this reason they are known as "line of sight frequencies." The height of the antenna largely governs the distance over which they can be used. This factor, however, favors their use in railroad service as eight to 10 miles is the distance normally required in all but two of its services (train to way station or bridging long wire breaks), and in these two cases the necessary distance can be obtained by the use of relay points and directional antennas.

The first problem of using existing facilities to the fullest occurred at Burr Oak Yard Office, where it became necessary to erect a high antenna at the yard office or utilize one of the existing flood light towers, which was well adapted for use as an antenna but was some distance from the office building. To install the sending and receiving equipment in the yard office, and to erect a high antenna nearby, would have been a costly procedure, and to excavate and install a shielded cable from the tower to the yard office would have been both expensive and impractical because of the high transmission losses that would have resulted at microwave frequencies. It was decided that the best engineering practice would require a weather-proof housing for the radio equipment at the foot of the tower and transmit the voice over a telephone line to and from this equipment. This makes a very flexible arrangement that can be used miles from the location of the station, and also has the advantage of using existing structures.

On June 5, 1944, the Burr Oak Yard installation was officially opened by conversation from the Yard Office to Diesel Engine No. 701 operating in the Burr Oak Yard area. This was the first installation of its kind by any railroad operating under its own license. The installation has been in continuous service since that time and has been

(Continued on page 384)

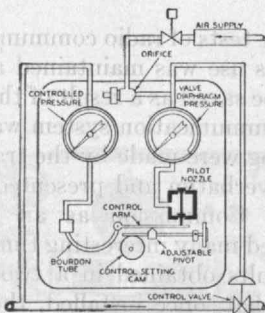


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RADIO FOR RAILROADS

(Continued from page 382)

viewed by newspaper men, engineers, and representatives from many railroads in this country as well as those from Canada and England.

Following the yard installation, tests were conducted on freight trains operating between Chicago and Kansas City. The initial test run left Chicago on Sunday, June 18, 1944. An interesting feature of this test was the four-way communication maintained between the engine, the caboose, the Yard Office, and the LaSalle Station office building, continuous contact being maintained with the locomotive from the LaSalle Station office until the locomotive reached Joliet, 40 miles distant. During this time a running conversation was also maintained with the Burr Oak Yard office as well as with the train. As the train left Burr Oak, one of the heaviest electrical storms of the year developed. Although there was an excessive amount of static, it could not be heard and there was no interference with the conversation — definite proof of what can be expected from the use of microwave radio communication systems.

All these tests have been made under the many varying conditions under various types of topographical conditions as they exist between Chicago and Kansas City and between Denver and Salt Lake City, the latter tests being made jointly with the Denver and Rio Grande Western. In most tests, automatic written records were kept that gave a signal-to-noise ratio for later computation of power and distance requirements.

The Rock Island has also successfully completed tests demonstrating the use of facsimile and found that written messages can be transmitted by radio to trains while in motion. Similarly the train crew could transmit a written acknowledgement of the message back to the dispatcher. In the case of train orders, it would be necessary only for the conductor and engineer to sign the received order and place it in their respective facsimile transmitters and retransmit it to the dispatcher with their signatures. This would be sufficient evidence to the dispatcher that the order had been properly transmitted and received. This system is not advocated at the present time, but tests indicate that such a system could be used under certain conditions if approved by the Interstate Commerce Commission.

In connection with these tests of radio communication, a running log record of its use was maintained and the probable time that could be saved as a result of the adoption of a railroad radio communication system was reckoned. The entries in the log were made by the train conductors and were copied verbatim and presented to the Federal Communications Commission as an exhibit. These entries demonstrated many interesting timesaving features. In fact, the results obtained in a two weeks' continuous test indicate that, once installed, these systems will pay their own way. They will, in effect, result in a saving in operating time of at least 30 seconds per mile. Probably the operation most frequently commented upon dealt with the setting out of cars. It is well known that, under certain conditions of weather and terrain, a visual signal cannot be transmitted from the rear to the front of a train. Therefore, when it is required to stop the train from the rear, air must be applied at the caboose, which

(Concluded on page 386)

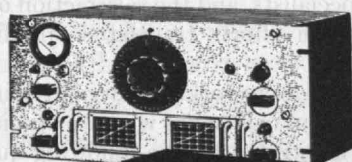
NATIONAL RECEIVERS ARE THE EARS OF THE FLEET



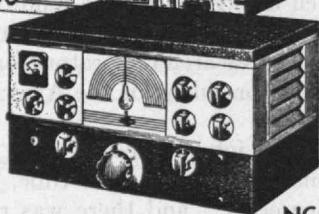
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RADIO FOR RAILROADS

(Concluded from page 384)

causes the brakes to set progressively from the rear toward the front. Before it becomes apparent to the engineer that something is wrong, the train may have pulled apart. When this happens, the delay often amounts to several hours. Even if the train is brought to a stop, the average delay can be reduced from about 35 minutes to 10 minutes if radio communication is available.

The Rock Island Lines was represented before the Federal Communications Commission railway hearing in Washington September 13 to 19, 1944, presented testimony covering the tests which had been made, and concluded testimony with this statement: "The Rock Island believes that radio is essential to the future operation of the railroads, and to insure continuity of service during abnormal periods, and respectfully asks that the Federal Communications Commission give serious consideration to allocating to the railroads such channels as will permit of its permanent use by them." At the Federal Communications Commission hearing October 31, 1944, the Rock Island again requested channels for its use. These requests were in addition to the 107 channels originally requested by the Association of American Railroads for railroads' use.

At the present time permanent channels for the use of radio on railroads have not yet been assigned by the Federal Communications Commission and further progress depends upon such channel assignments. Within a very short period after such authority is received from the Commission, it is believed that most of the major railroads of the United States will utilize radio for the operation of their yards and trains.

UNIVERSITY OR INDUSTRY?

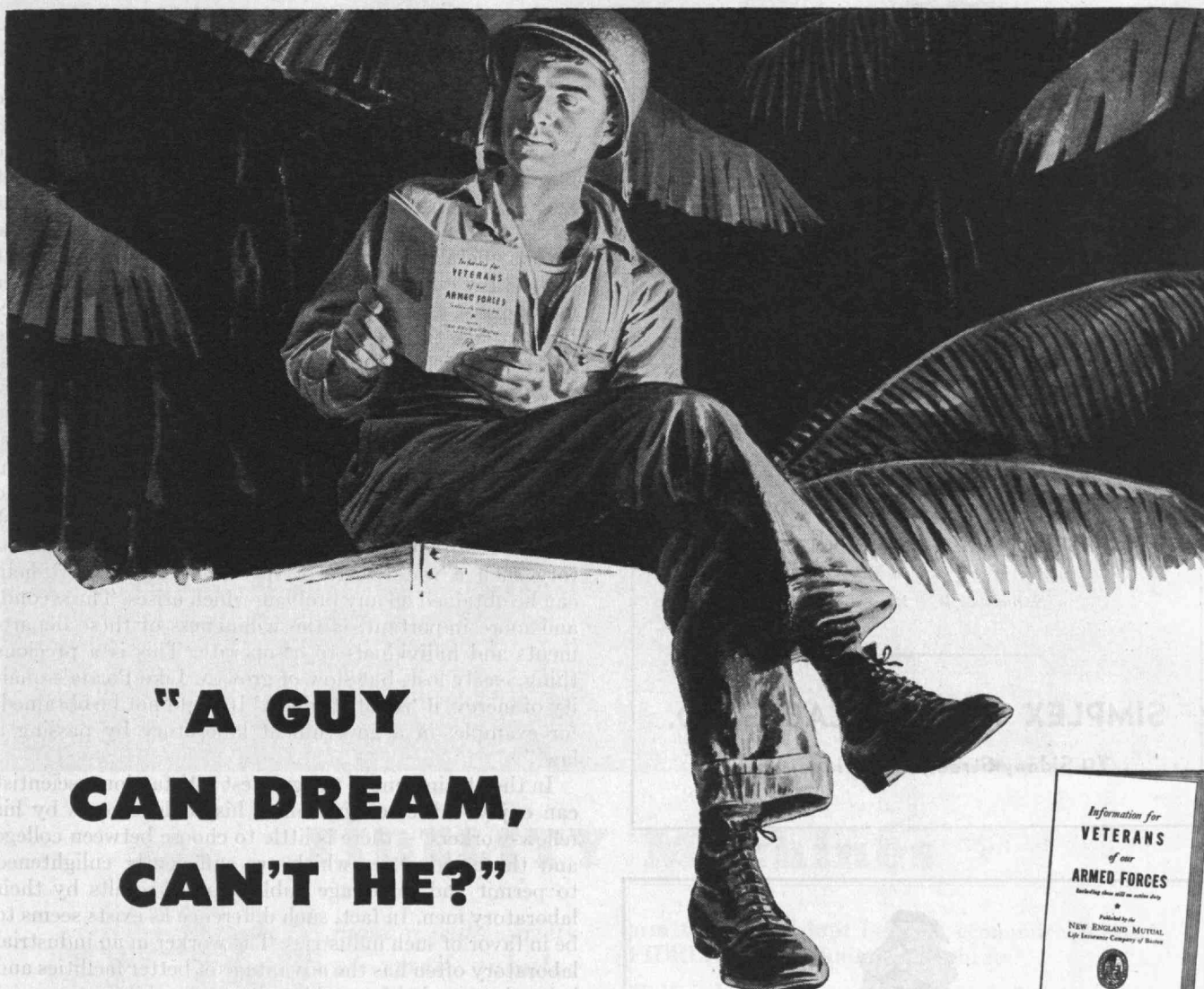
(Continued from page 366)

action and the long vacations are enjoyable. In a large industrial laboratory employing physicists, chemists, metallurgists, and engineers, diverse and stimulating interests are to be found, but admittedly the leisurely dignity of the college and some of its freedom are lacking. The atmosphere is rather one of action and at times of urgency. Some adherence to a schedule of working hours is to be expected. To some scientists this is unattractive, but to more it is more than offset by the constant stimulus of live problems, the excellent facilities provided without the irksome and time-consuming canvass for funds sometimes necessary in university research, the helpful support of an able staff of specialists, and the satisfaction of seeing the results of research efforts translated speedily into useful applications.

The assistance a research worker may receive in an industrial laboratory from colleagues who are specialists in other fields is well illustrated by the following quotation from an address by Dr. A. W. Hull, assistant director of the General Electric Research Laboratory, on the occasion of his retirement as president of the American Physical Society:

"In one of our war jobs we needed some means of air-conditioning a metal mercury-vapor tube. The tube operated at 200 degrees C., and there was needed an insulated wire winding and a nonmetallic housing cylinder

(Concluded on page 388)



"A GUY CAN DREAM, CAN'T HE?"

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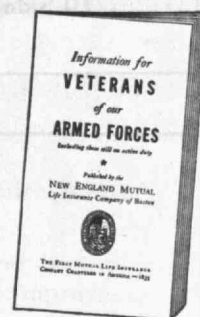
How to keep it in force, how to reinstate, and convert, with rates.

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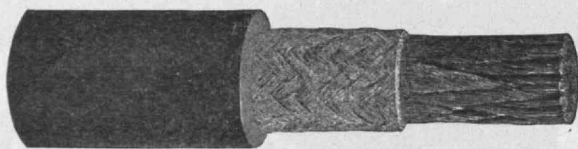
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UNIVERSITY OR INDUSTRY?

(Concluded from page 386)

that would stand this temperature. Glass-insulated wire was obtained from one of the factory departments, and was impregnated with a new high temperature Silicone varnish by our chemists, who also furnished us with sheet Silicone for the housing. In two weeks the problem was solved. On another job some sheet Invar was needed. One of our metallurgists was able to provide curves that showed the correct composition for our purpose. Another metallurgist agreed to melt a 40-pound ingot in his induction furnace the next morning, and deliver it that same day to the factory forge shop for forging. Following this, it was rolled to the desired thickness in our laboratory metalworking department, spun into form in the machine shop and incorporated in a tube, all within two weeks. There was no haste about these jobs. They were not 'rush' projects, but just everyday problems. Two points are to be emphasized in this matter of co-operation. The first is the advantage of having grouped together in a laboratory such a wide range of specialists that expert help can be obtained on any problem which arises. The second, and more important, is the willingness of these departments and individuals to co-operate. This is a precious thing, easily lost, but slow of growth. Like Portia's quality of mercy, it 'is not strained.' It could not be obtained, for example, in a government laboratory by passing a law."

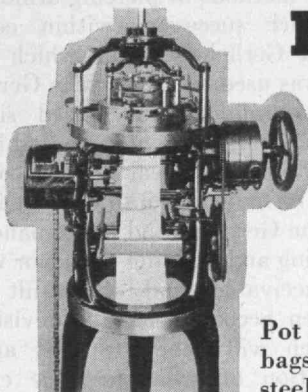
In the attainment of the greatest satisfaction a scientist can enjoy — the recognition of his achievements by his fellow-workers — there is little to choose between college and those industries which are sufficiently enlightened to permit and encourage publication of results by their laboratory men. In fact, such difference as exists seems to be in favor of such industries. The worker in an industrial laboratory often has the advantage of better facilities and help when needed from able colleagues, while commercial considerations lead an industry to publicize, as widely as professional dignity will permit, the achievements of its research men.

In opportunity for contacts with fellow scientists in other institutions, there is little difference between the college and most industrial laboratories. The same enlightened policy which leads a company to encourage publication by its research men dictates liberality in sending its men to the meetings of scientific societies, to present their papers, participate in discussions, and extend their acquaintance with fellow scientists with similar interests. It also encourages interchange of visits with both collegiate and industrial scientists. There is no danger of isolation in the modern industrial research laboratory.

A man will always do his best work in an environment which is most congenial. Many will continue to find their most agreeable surroundings on the college campus. Fortunately so, for it is for the best interests of college and industry alike that the colleges draw to themselves an adequate supply of the ablest science graduates. But those to whom the associations and opportunities of the world of industry appeal may be pleasantly surprised to find today in many an industrial laboratory much of the freedom of action, stimulus of intellectual contact, and freedom to publish results which formerly were to be found only in college or university.

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THE TREND OF AFFAIRS

(Continued from page 360)

to find the value of π by writing down the appropriate digits under the following formula:

*Que j'aime à faire apprendre
un nombre utile aux sages!
Glorieux Archimède! Artiste ingénieux!
Toi de qui Syracuse
Aime encore la mémoire!*

This has the real Gallic enthusiasm and appreciation of genius; and it gives the desired value correct to the 21st place, and nearly correct in the 22d. But what on earth did Archimedes know about decimals? Not a bit more than did Euclid, and that was just nothing. They lived about seventeen hundred years too soon. No, Shanks was the boy! And besides, Archimedes has 10 letters in his name in English; so we couldn't use him. Nor could we possibly be content with only 21-place precision. So we see the French 21, and we raise 'em 11; and things being as they are, *no one can't do no more.*

Gerlich Guns and Munroe Charges

AMONG the technological innovations of the present war two are of special interest because they constitute the first applications of their respective principles in actual warfare. Both are methods of piercing armor and both have proved rather successful within certain limitations. They are the Gerlich-type gun which originated in Germany and was used mainly by the Germans (although the Russians seem to have tried similar weapons) and the Munroe charge which originated in the United States and constitutes the real potency of the famed bazooka. Since its introduction into combat it has been imitated by both the Germans and the Japanese.

The problem of designing and building an armor which can withstand any conceivable kind of assault and, after that task has been accomplished, of devising a method of assault which will penetrate that armor, has occupied the attention of armorers since classic times. During the Middle Ages it seemed as if the armor had won, especially when the personal armor could be complemented by a shield. But then German armorers devised the so-called *Panzerbrecher*, or armor-breaker, which took the form of a heavy two-handed sword, often a so-called *Flamberg* with a flamed blade which was less likely to slide off.

(Continued on page 392)

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(Continued on page 394)

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WHERE
Printing
IS STILL A CRAFT

THE TREND OF AFFAIRS

(Continued from page 390)

Italian armorers, and German armorers in Italian employ, answered with the *Panzerstecher*, or armor-piercer, an especially light and thin sword which could be wielded with great agility and was supposed to slip through the joints in the armor. But the end of personal armor came through missile weapons, the powerful English longbow, the even more powerful mechanical crossbow, and, finally, firearms.

Armor returned after the invention of the internal combustion engine which could move armor heavy enough to withstand even the fire of modern small arms. It then became necessary to develop special antitank weapons but for obvious technical reasons these modern *Panzerbrecher* had to take the form of artillery pieces which fired fairly large projectiles — the old 37-millimeter proved to be too small in World War II — and which were rather large and heavy themselves. Since antitank artillery could not be everpresent along a long frontline, it was obvious that ordnance experts should devote their energies to the creation of a modern equivalent of the *Panzerstecher*, even though they hardly applied that term in considering the problem.

The Germans seized upon an invention which had been made by a German gunsmith and gunnery expert during the interval between the two World Wars and had been offered by him to various governments and had been given extensive demonstrations, including one at Aberdeen during the early 1930's. The name of the inventor was H. Gerlich of Kiel, who during 1900 and 1901 had worked as an apprentice of the firm of Vickers Sons and Maxim, Ltd., in England. It was Gerlich's ambition to increase the muzzle velocity of firearms without adding unduly to the length of the barrel. His reasoning was that a high muzzle velocity would not only increase accuracy greatly but also benefit the weapon all around. A faster bullet could be smaller and lighter and so would reduce the size and weight of the cartridge, enabling one man to carry a larger number of rounds.

This idea took the form of a barrel consisting of two cylindrical sections of different caliber, joined together by a conical section. The bullet fired from such a barrel would actually fit the narrower portion near the muzzle, but would adapt itself to the larger diameter at the firing chamber by means of collapsible copper or brass "skirts." While passing through the conical section of the

(Continued on page 394)

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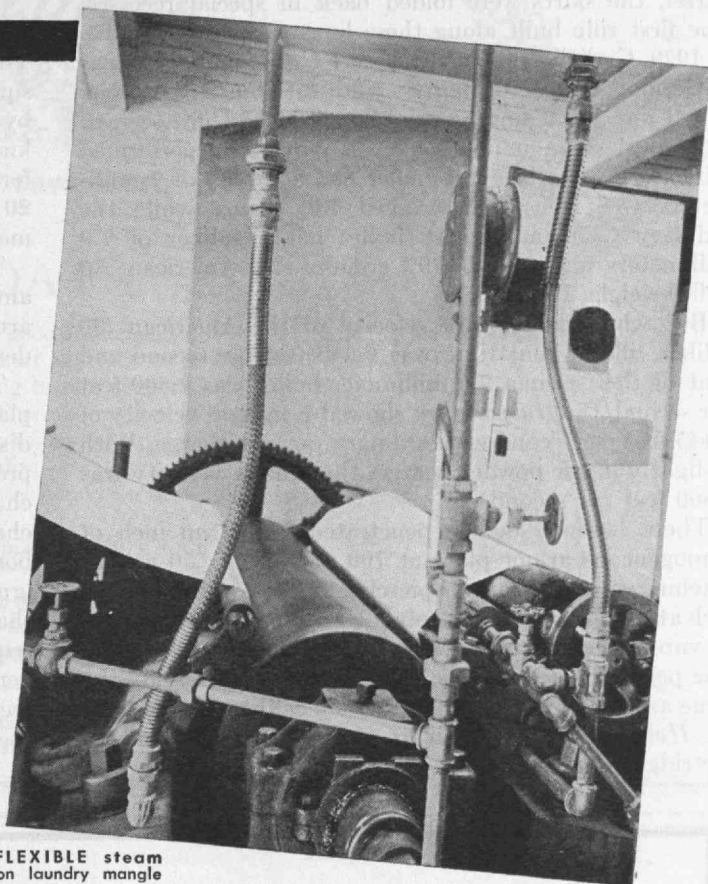
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THE TREND OF AFFAIRS

(Continued from page 392)

barrel, the skirts were folded back in special recesses. The first rifle built along these lines was ready in 1928 or 1929. Gerlich called it the *Halger Ultra*; actually it was a German Mauser infantry rifle with such a special barrel and skirt ammunition. The *Halger Ultra* seemed more or less an impossibility on paper but performed miracles in practice. The bullet had a caliber of 7 millimeters (.28 inch) and weighed 139 grains, while the ordinary German infantry bullet has a caliber of 7.9 millimeters and weighs 197 grains. The American .30 bullet weighs 173 grains.

But while the muzzle velocity of the American .30 caliber rifle of that time was 2,640 feet per second and that of the German 7.9 millimeter bullet was 2,560 feet per second, the *Halger Ultra* showed a muzzle velocity of 4,445 feet per second with ordinary powder charge. With a slightly larger powder charge, the muzzle velocity was 5,800 feet per second.

These .28-inch bullets penetrated $\frac{7}{16}$ of an inch of homogeneous armor plate at 700 yards (the .50 caliber machine gun with armor-piercing bullets will pierce $\frac{1}{2}$ inch at 1000 yards) and a total of 1 inch of armor plate at 70 yards (the .50 caliber will pierce 1 inch at 100 yards). The performance, as these figures show, was roughly the same as that of the much heavier .50 caliber weapon, but the *Halger Ultra* was as light as any other rifle and its cartridges weighed less!

Of course there was a drawback, in this case the difficulty of producing the deeply rifled compression barrel. It had to be done by hand which made the weapon fantastically expensive; figures of \$500 and even \$700 per barrel were named.

The Nazis sought to overcome this difficulty after Gerlich's death by using smoothbore tapered barrels. The outcome of these experiments was the so-called squeegee gun which was encountered for the first time by the British in North Africa. To the Germans it was known as the *28/20 Pak*, the figure 28 (millimeters) referring to the caliber near the firing chamber, the figure 20 (millimeters) to the caliber at the muzzle, while *Pak* means *Panzer Abwehr Kanone*, or antitank cannon.

The weapon fired solid slugs with a muzzle velocity amounting in round figures to one mile per second. Its armor-piercing power was enormous, but it seems to have developed loading troubles.

The other new method of blasting through armor plate is known as the Munroe effect, so named for its discoverer, the late Charles E. Munroe. The charges which produce the effect are known as Munroe charges, hollow charges, or shaped charges. As their name implies they are charges of high explosive into which a cavity has been bored or which were formed over a core. The charge is ignited inside the cavity, which is roughly conical in shape. Although the explosion of the whole charge requires only infinitesimal fractions of a second, the very short interval of time during which the outer sections of the charge remain intact is sufficient to focus the explosion much in the same manner in which a parab-

(Concluded on page 396)

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THE TREND OF AFFAIRS

(Concluded from page 394)

old mirror focuses light rays. In fact it is reported that an exploding Munroe charge which has been made to point upward produces an effect resembling a momentarily stabbing searchlight beam.

The focused explosive force of a Munroe charge penetrates armor even more effectively than a high velocity projectile. Such Munroe charges are used not only in the American bazooka antitank rocket, but also in German and Japanese rifle grenades and other projectiles. They work better in low velocity projectiles like rockets and rifle grenades because it has been found greatly advantageous, almost essential, that the mouth of the Munroe charge be some short distance from the armor at the moment of explosion. If the charges are used in demolition work this additional distance can be easily produced through providing the casing with spacers.

If the charges are fired at the enemy, the only way in which this distance can be produced is a long nose which causes explosion at the instant of touching the target. Of course there is a short delay between first touch and actual explosion. The delay is so short that it can be neglected in the case of a slow-moving projectile, but may cause extra difficulties with high-velocity projectiles.

The strange fact about the Munroe charge is that it was discovered about 60 years ago and that 30 years ago patents for its application were granted in Germany as well as in England. Such charges were even used commercially in various countries in mining, but military circles paid no attention to them until World War II.

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THE INSTITUTE GAZETTE

(Concluded from page 372)

treatment in the clinic for conditions which arose before their coming to the Institute, and the point was made that the care of cases so arising should be at the account of the patient and not provided without cost by the Institute. The Committee was of the opinion that in view of the fact that so large a proportion of the employees are now at the Institute on account of conditions which are temporary, matters involving permanent adjustment had better be held as they are for the duration of the war, and that normal adjustments await more normal conditions. After careful consideration, upon motion by Dr. Means, duly seconded, it was voted that no change in the manner of treatment and charges for the same be made for the duration of the war, but that at the end of the war the matter of whether the employees, the Faculty, and the students should be treated by the Institute Clinic or by their own physicians for pre-existing diseases should be discussed. The importance of having ailments treated by a doctor paid by the patient and responsible for his treatment and cure was emphasized.

The Committee was interested to hear that a bequest of \$75,000 had been made as an endowment for the Eye

Clinic, and, after payment for the equipment now shortly to be installed, would yield between \$2,500 and \$3,000 a year. The Committee was informed that by far the largest proportion of physical defects found among those who came for examination had to do with the eye. Upon motion made by Dr. Gile, and duly seconded, it was voted that it is the recommendation of the Committee that an ophthalmologist be procured to examine those patients requiring care, and that he direct such patients to a specialist for the proper treatment.

The question was raised as to the necessity or desirability of compulsory vaccination or immunization of all students for smallpox, typhoid, tetanus, scarlet fever, diphtheria, and so on. It was the opinion of the Committee that it is unnecessary to deal with these problems at present as almost all the students, in connection with their relation to the Army and Navy, or in case of vaccination under the State law, are well enough taken care of for the present, but the Committee agreed with Dr. Morse that the Department should be always on the alert to detect the first symptoms of any epidemic diseases and be ready at short notice to undertake a vigorous campaign of prevention.

* Members of the Committee for 1944-1945 are Dr. John A. Rockwell, '96, Dr. William J. Mixer, '02, Dr. James H. Means, '06, Dr. Reginald H. Smithwick, '21, John E. Aldred, W. Cameron Forbes, chairman, and Dr. John F. Gile.



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Northwest	46
West Coast	266
Middle West	132
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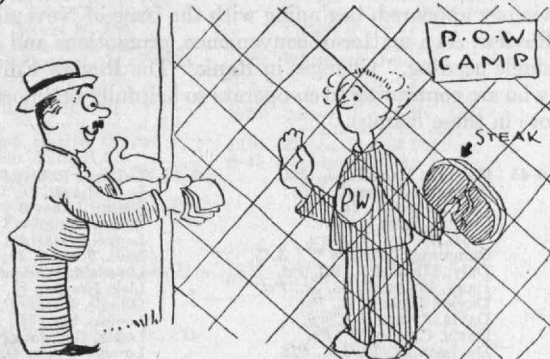
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TECHNOLOGY MEN IN ACTION

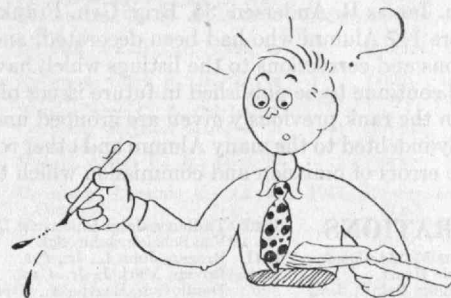
THE ALUMNI FUND — ITS PROBLEMS AND GROWTH

ANNUAL REPORT — A FEW ITEMS THAT WERE LEFT OUT

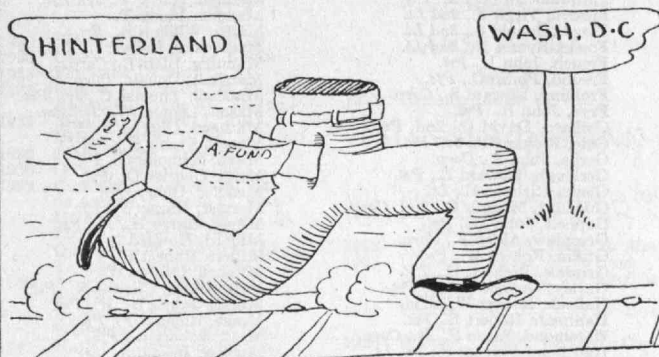
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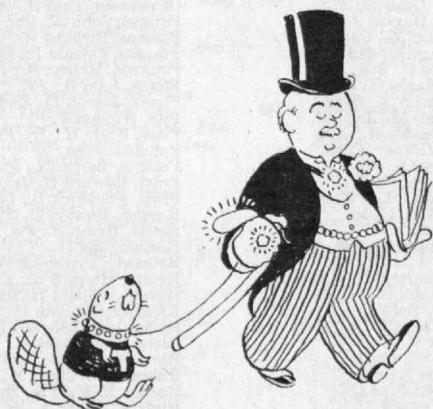
30 % OF ALUMNI BODY CONTRIBUTED



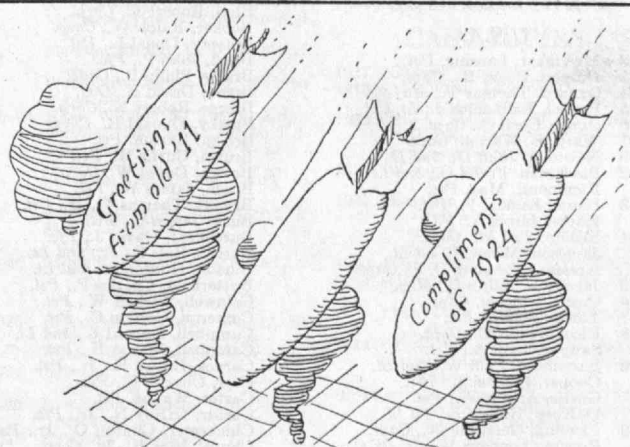
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TECHNOLOGY MEN IN ACTION

M.I.T. MEN AT WAR

Up to March 15 over 7,668 Institute Alumni, including 33 Admirals, 4 Commodores, and 90 Generals, were recorded as being in the active naval or military services of the United Nations. Among the new additions this month are Maj. Gen. Edmund W. Hill '19, Brig. Gen. Harold A. Nisley '23, Rear Adm. Albert Noble '23, Rear Adm. Frank G. Fahrion '24, Brig. Gen. John B. Franks '25, Brig. Gen. Charles K. Gailey, Jr., '30, Maj. Gen. Frank D. Merrill '32, Brig. Gen. James R. Andersen '34, Brig. Gen. Frank S. Besson, Jr., '35, and Rear Adm. Harold G. Bowen, Jr., '37. There were 147 Alumni who had been decorated, and 112 who had made the supreme sacrifice.

Additions and corrections to the listings which have previously appeared, beginning with the issue of November, 1942, will continue to be published in future issues of The Review. As a matter of convenience, promotions and corrections in the rank previously given are grouped under a single heading, "Changes in Rank." The Review Editors are greatly indebted to the many Alumni and other readers who are continuing to co-operate so helpfully in reporting inevitable errors of omission and commission which they note in these listings.

NEW DECORATIONS

- | | | | |
|--|--|--|---|
| <p>1912**Wyman, Dwight M., Lt. Comdr., U.S.N., Purple Heart.</p> <p>1918★McVickar, Lansing, Col., U.S.A., Bronze Star.</p> <p>1921 Smyser, Harold E., Col., U.S.A., Legion of Merit.</p> <p>1923 Randall, Russell E., Brig. Gen., U.S.A., second Oak Leaf Cluster to the Air Medal; Legion of Merit and Oak Leaf Cluster.</p> <p>1924 Doolittle, James H., Lt. Gen., U.S.A., Oak Leaf Cluster to the Distinguished Service Medal.</p> <p>1926 Dean, Robert C., Lt. Col., U.S.A., Bronze Star—for meritorious service in connection with operations against the enemy in the region of Colmar, France.</p> <p>1927 Harrison, Edwin H., Col., U.S.A., Legion of Merit.</p> <p>1932 Osborne, Ralph M., Col., U.S.A., Legion of Merit.</p> <p>1936 Call, William A., Col., U.S.A., Legion of Merit.</p> <p>1938 Welling, Alvin C., Col., U.S.A., Legion of Merit—for his pioneer work on the Alcan Highway through Canada and Alaska.</p> <p>1939**Demange, Robert C., 1st Lt., U.S.M.C., Purple Heart—Central Pacific theater.</p> <p>1941 MacLeod, John H., Jr., Capt., U.S.A., Air Medal and Oak Leaf Cluster.</p> <p>Melchor, Alejandro, Col., Philippine Army, Legion of Merit—for exceptionally meritorious conduct in the performance of outstanding services with tireless energy, thorough understanding, great professional knowledge, and consummate skill.</p> <p>1943 Shakhov, Irving, 2nd Lt., U.S.A., Bronze Star.</p> <p>10-44**English, Wallace A., Pvt., U.S.A., Silver Star; Purple Heart.</p> <p>6-45 Pearson, Donald L., Lt., U.S.A., Air Medal and Oak Leaf Cluster.</p> | <p>1940 Tudbury, John L., Jr., 1st Lt.</p> <p>1941 Brogan, John L., Jr., Pvt.</p> <p>Brown, Mark J., Jr., Capt.</p> <p>Danilovich, Eugene A., Capt.</p> <p>Mann, Martin, 1st Lt.</p> <p>Potter, William D., Pvt.</p> <p>Ryrdholm, Arthur R., Capt.</p> <p>Snyder, Willard R., Capt.</p> <p>Vian Tuyl, Richard A., 2nd Lt.</p> <p>Viola, Charles L., Pvt.</p> <p>1942 Bliss, Gordon M., Pvt.</p> <p>Muir, William C., Corp.</p> <p>Roberts, William L., Capt.</p> <p>Sollenberger, Robert J., Capt.</p> <p>1943 Booker, Clyde A., Jr., 1st Lt.</p> <p>Byfield, Hugh W., 2nd Lt.</p> <p>De Conto, Joseph J., T.4.</p> <p>Dyer, Thomas K. M., A.C.</p> <p>Hartshorne, Jean C., 2nd Lt.</p> <p>Kempster, John H., Corp.</p> <p>Kibrick, Sidney, Pvt.</p> <p>Leader, Ralph E., 2nd Lt.</p> <p>Lewis, Gilbert W., Pvt.</p> <p>McCarthy, Walter C., 2nd Lt.</p> <p>Moulton, William R., 1st Lt.</p> <p>Raczynski, Andrew T., Pvt.</p> <p>Sullivan, John J., Jr., Pvt.</p> <p>2-44 Dewep, Clayton K., Corp.</p> <p>Luttinger, Joaquin M., Pvt.</p> <p>Meier, Frederick B., Pvt.</p> <p>10-44 LaRochelle, John H., Pvt.</p> <p>6-45 Abramson, Harold B., 2nd Lt.</p> <p>Agoston, Peter P., Pvt.</p> <p>Antonich, Kenneth G., 2nd Lt.</p> <p>Armenante, Antonio A., Pfc.</p> <p>Avallone, John C., A.C.</p> <p>Ayer, William H., A.C.</p> <p>Bachelder, Millard N., Pvt.</p> <p>Bain, James, Jr., 2nd Lt.</p> <p>Balas, William, Pfc.</p> <p>Baldwin, Louis B., Jr., A.S.</p> <p>Ball, James L., A.C.</p> <p>Banks, John H., Pvt.</p> <p>Barker, Allan M., Pvt.</p> <p>Barnes, James A., Pvt.</p> <p>Barron, Ellis L., Pvt.</p> <p>Beattie, Harry J., Jr., T.Sgt.</p> <p>Beck, Alfred E., Jr., Pvt.</p> <p>Bennett, Edward M., Pvt.</p> <p>Bernan, James K., Corp.</p> <p>Bernstein, Gerald D., A.C.</p> <p>Berry, Warren O., Corp.</p> <p>Blanc, Louis F., Pvt.</p> <p>Bliss, Robert L., Corp.</p> <p>Booker, Ralph W., Corp.</p> <p>Botway, Donal L., Pvt.</p> <p>Boyd, John P., Pfc.</p> <p>Brady, Philip B., Cadet</p> <p>Breed, David E., O.C.</p> <p>Breese, Robert K., Corp.</p> <p>Bresky, Donald R., Corp.</p> <p>Brown, Barton, Pvt.</p> <p>Brown, Curtis H., Pvt.</p> <p>Brown, David W., Corp.</p> <p>Brush, James W., Pvt.</p> <p>Bryant, Thomas V., Jr., Pvt.</p> <p>Buck, James C., Pvt.</p> <p>Burchfield, David J., Pfc.</p> <p>Burrus, Ray C., Jr., 2nd Lt.</p> <p>Burton, Gordon L., 2nd Lt.</p> <p>Butterfield, Charles P., Pvt.</p> <p>Caldwell, Nichols W., Pvt.</p> <p>Cameron, Gordon C., Pvt.</p> <p>Campbell, Donald L., 2nd Lt.</p> <p>Campbell, Mason H., Pvt.</p> <p>Carnes, Edwin H., Jr., Pvt.</p> <p>Carr, Charles E., Pfc.</p> <p>Carter, Wayne, Pvt.</p> <p>Castor, LaRoy N., Jr., Pfc.</p> <p>Chichester, Clinton O., Jr., Pvt.</p> <p>Chudy, Max R., Jr., Corp.</p> <p>Clement, Robert C., 2nd Lt.</p> <p>Clifford, John M., Pvt.</p> <p>Coombs, William F., Jr., O.C.</p> <p>Coons, George F., A.C.</p> <p>Cordner, Frederick W., 2nd Lt.</p> | <p>6-45 Courant, Hans W. J., Pvt.</p> <p>Cowdery, James R., Pfc.</p> <p>Cox, Robert S., Jr., Pfc.</p> <p>Craigie, Hugh A., Pfc.</p> <p>Cross, Henry H., Corp.</p> <p>Cummings, Eustace W., A.C.</p> <p>Daly, Michael J., 3rd, Pvt.</p> <p>Dann, Benjamin G., Jr., Pvt.</p> <p>Davies, Richard L., Pvt.</p> <p>Davis, Arthur S., Corp.</p> <p>Davis, Charles W., Pvt.</p> <p>Davissou, Richard J., Pfc.</p> <p>Day, Joseph P., 3rd, Corp.</p> <p>de Mars, George A., A.C.</p> <p>de Vries, John A., A.S.</p> <p>Diamond, Aaron L., Pvt.</p> <p>Dick, Philip A., Pvt.</p> <p>Dorsey, Leo D., Pfc.</p> <p>Doyle, Matthew J., Jr., 2nd Lt.</p> <p>Dulack, Joseph T., Pvt.</p> <p>Edwards, Alfred E., Jr., Lt.</p> <p>Edwards, Horace L., Pvt.</p> <p>Enos, John L., Pvt.</p> <p>Falabella, Gaetano, Jr., Corp.</p> <p>Farquhar, Robert A., Pvt.</p> <p>Ficarra, Virgil F., 2nd Lt.</p> <p>Floyd, Donald S., 2nd Lt.</p> <p>Fowle, Everett N., 2nd Lt.</p> <p>French, John L., Pvt.</p> <p>Freund, Philip C., Pfc.</p> <p>Frohling, Edward S., Corp.</p> <p>Frye, John R., Pvt.</p> <p>Gaillard, David D., 2nd, Pvt.</p> <p>Gale, Richard P., Jr., Pvt.</p> <p>Gale, John A., Corp.</p> <p>Gerda, John A., Corp.</p> <p>Glenn, Richard E., Lt.</p> <p>Goddard, Murray C., 2nd, Corp.</p> <p>Goppelt, John W., Pvt.</p> <p>Greenlaw, Alden F., Corp.</p> <p>Griffin, Robert W., Pvt.</p> <p>Grisdale, Richard D., Pvt.</p> <p>Gurley, George B., Jr., Pvt.</p> <p>Hallock, Robert W., Mid.</p> <p>Hamman, Robert L., Pvt.</p> <p>Hammond, Elton F., Jr., Corp.</p> <p>Haneman, Vincent S., Jr., Lt.</p> <p>Hartman, Lloyd W., Jr., Pvt.</p> <p>Havener, Arthur R., Jr., Corp.</p> <p>Hellar, Martin W., Jr., Pvt.</p> <p>Helmers, Edward N., Pvt.</p> <p>Henze, Henry L., Corp.</p> <p>Hilton, Thomas L., Pvt.</p> <p>Holzwarth, Charles W., Pvt.</p> <p>Hoyt, Earl D., Pvt.</p> <p>Hulswit, Frank T., Corp.</p> <p>Humphrey, Dean E., Pfc.</p> <p>Humphrey, Harvey J., Pvt.</p> <p>Hunt, Donald M., Cadet</p> <p>Inman, Harry A., 2nd Lt.</p> <p>Irwin, James C., 3rd, Pvt.</p> <p>Jackman, Waldo C., Jr., Corp.</p> <p>Jalbert, Roland A., Corp.</p> <p>Jansen, Hugh M., Jr., Pvt.</p> <p>Jenkins, Donald, Jr., A.S.</p> <p>Jennison, Whitney, Corp.</p> <p>Jones, Harry G., Pvt.</p> <p>Jones, John R., Pvt.</p> <p>Jonsson, Philip R., Pvt.</p> <p>Julian, Paul F., Cadet</p> <p>Kahn, Burton H.</p> <p>Kalette, Denny C., Pvt.</p> <p>Kaufmann, Axel H., Pfc.</p> <p>Keepnews, Lawrence W., 2nd Lt.</p> <p>Kennett, Frank E., Jr., Pvt.</p> <p>Kessler, Ira, 2nd Lt.</p> <p>Keniston, Davis B., Jr., Corp.</p> <p>Kiefer, Jack C., Pvt.</p> <p>Kind, Paul W., Corp.</p> <p>King, Robert L., Pvt.</p> <p>King, Warren J., A.C.</p> <p>Kingman, Donald</p> <p>Klagstad, Robert E.</p> <p>Kralik, John J., Jr., Cadet</p> <p>Krewson, George C., 3rd, Pvt.</p> <p>Kurth, Malcolm H., Pvt.</p> <p>Lacy, Thomas B., Pvt.</p> <p>Lampher, Edward J.</p> | <p>6-45 LaPlace, Robert F., Pvt.</p> <p>Law, Russell L., Jr., Pvt.</p> <p>Leahy, James B.</p> <p>Lehner, Peter</p> <p>Leupold, Mathias J., A.C.</p> <p>Leva, Jerome, Jr., Corp.</p> <p>Levedahl, William J., 1st Lt.</p> <p>Lisk, Norman E., Jr., A.C.</p> <p>Loomis, George P., Jr., Pvt.</p> <p>Loomis, Stan H., A.C.</p> <p>Lopez, George A., Corp.</p> <p>Lowrie, Walter O., Lt.</p> <p>Lutman, Byron O., Jr.</p> <p>Mabe, Joseph L., Pvt.</p> <p>McChrystal, Richard G.</p> <p>McCorry, Francis V., Jr., Pvt.</p> <p>McDonald, Crawford</p> <p>McDonald, Robert A., Pfc.</p> <p>McDonald, William P., Corp.</p> <p>MacFarland, Howard T., Corp.</p> <p>McKibben, Leonard N., Pvt.</p> <p>McLaughlin, Judge</p> <p>MacLeod, William A., Jr., Pvt.</p> <p>McSwiney, Daniel D.</p> <p>Madden, Harry V., Jr., Pfc.</p> <p>Madden, James T.</p> <p>Maley, William B., Pvt.</p> <p>Malkovsky, Robert L., Pvt.</p> <p>Manning, Blair L., Corp.</p> <p>Marshall, Donald, Corp.</p> <p>Marshall, Thomas C., Jr., Pvt.</p> <p>Mason, Lemuel W., Jr., Pvt.</p> <p>Mathews, Charles P., Pvt.</p> <p>Mauck, Frank H., 2nd Lt.</p> <p>Mayo, Edmund C., Pvt.</p> <p>Mead, Charles D., Pvt.</p> <p>Mender, Henry, Pvt.</p> <p>Mergler, Harry W., Pfc.</p> <p>Meyer, Harry H., Jr., Pvt.</p> <p>Millard, Howard L., Lt.</p> <p>Millett, Robert H., Pvt.</p> <p>Mitchell, George W.</p> <p>Mitropoulos, Charles N., Pvt.</p> <p>Morris, James B., Jr., Pvt.</p> <p>Morse, Richard F., Pfc.</p> <p>Mott, Robert R., Pfc.</p> <p>Mueller, Joseph A., Lt.</p> <p>Munroe, Willard N., Jr., A.C.</p> <p>Nagel, James C., A.C.</p> <p>Nahm, Robert E., Corp.</p> <p>Nau, Norman F., 2nd Lt.</p> <p>Nersasian, Arthur, Pvt.</p> <p>Nichols, Charles K., Pfc.</p> <p>Nowell, John T., Pfc.</p> <p>Olsen, Ralph C., Pfc.</p> <p>Orthwein, William C., Pvt.</p> <p>Ostergaard, Paul B., A.C.</p> <p>Pampel, John K., Pvt.</p> <p>Parsons, Richard W.</p> <p>Pearson, Donald L., Lt.</p> <p>Peterson, Robert K., Pvt.</p> <p>Pierce, John B., Pvt.</p> <p>Pigott, Joseph D., Cadet</p> <p>Pitt, William F.</p> <p>Pitts, Wade H., Jr., Pvt.</p> <p>Polimou, John</p> <p>Posthill, Bertin N., Pvt.</p> <p>Pratt, Edward B., Jr., A.C.</p> <p>Pratt, Frederick L., Lt.</p> <p>Raynor, Preston C., Pvt.</p> <p>Reade, Kemp B., Pvt.</p> <p>Rescher, Jay G.</p> <p>Reusswig, Frederick W.</p> <p>Reuter, Howard A., T.5.</p> <p>Revoir, William H., Jr., Pfc.</p> <p>Richards, William B., Pfc.</p> <p>Richardson, Leonard F., Pvt.</p> <p>Richardson, Peter H., Pvt.</p> <p>Rioux, Joseph G., Cadet</p> <p>Robinson, William R., Pvt.</p> <p>Rogers, Edward S., 2nd, Pfc.</p> <p>Rudkin, Henry A., Jr., Pvt.</p> <p>Sadri, Frederick F., Pvt.</p> <p>St. George, Leslie M., Pvt.</p> <p>Salisbury, Glenn C., Jr., Cadet</p> <p>Sawyer, Frederick W.</p> <p>Sawyer, Paul B.</p> <p>Sayles, Francis H.J., Pvt.</p> |
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NEW LISTINGS

U.S.A.

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| <p>1918★McVickar, Lansing, Col.</p> <p>1922 Damon, Roger H., Capt.</p> <p>1924 Oxnard, Thomas T., Maj.</p> <p>1925 Possiel, Rankenius J., Lt. Col.</p> <p>1926 Ogren, Cecil C., Capt.</p> <p>1927 Ward, E. Warren, Capt.</p> <p>1929 Newman, John D., 2nd Lt.</p> <p>1932 Blackman, Frank O., 2nd Lt.</p> <p>Richmond, Max, Pvt.</p> <p>1933 Baum, Samuel F., Pvt.</p> <p>Hayes, James A., F.O.</p> <p>1934 Bishop, Ted M., Capt.</p> <p>Jameson, Minor S., 1st Lt.</p> <p>Kresser, Theodore O. J., Capt.</p> <p>1935 Jacobson, Ralph L., Maj.</p> <p>1936 Crane, Chilton, Capt.</p> <p>1937 Tower, Daniel, Pvt.</p> <p>1938 Rice, Wilbur C., Capt.</p> <p>Sawyer, John A., Pvt.</p> <p>1939 Barenberg, Paul W., 2nd Lt.</p> <p>Cooper, Chester L., Pvt.</p> <p>Curtis, Arthur W., Pvt.</p> <p>DeKorp, Harold E., 1st Lt.</p> <p>1939 Fleming, Gertrude M., Capt.</p> <p>Rowley, Leonard W., Jr., W.O.</p> <p>Wooster, Robert B., Capt.</p> <p>1940 Chase, Robert W., 2nd Lt.</p> <p>Kilgore, Harold D., Jr., 2nd Lt.</p> <p>Krowka, Stanley J., Maj.</p> <p>Telesca, Donato R., O.C.</p> | <p>1940 Tudbury, John L., Jr., 1st Lt.</p> <p>1941 Brogan, John L., Jr., Pvt.</p> <p>Brown, Mark J., Jr., Capt.</p> <p>Danilovich, Eugene A., Capt.</p> <p>Mann, Martin, 1st Lt.</p> <p>Potter, William D., Pvt.</p> <p>Ryrdholm, Arthur R., Capt.</p> <p>Snyder, Willard R., Capt.</p> <p>Vian Tuyl, Richard A., 2nd Lt.</p> <p>Viola, Charles L., Pvt.</p> <p>1942 Bliss, Gordon M., Pvt.</p> <p>Muir, William C., Corp.</p> <p>Roberts, William L., Capt.</p> <p>Sollenberger, Robert J., Capt.</p> <p>1943 Booker, Clyde A., Jr., 1st Lt.</p> <p>Byfield, Hugh W., 2nd Lt.</p> <p>De Conto, Joseph J., T.4.</p> <p>Dyer, Thomas K. M., A.C.</p> <p>Hartshorne, Jean C., 2nd Lt.</p> <p>Kempster, John H., Corp.</p> <p>Kibrick, Sidney, Pvt.</p> <p>Leader, Ralph E., 2nd Lt.</p> <p>Lewis, Gilbert W., Pvt.</p> <p>McCarthy, Walter C., 2nd Lt.</p> <p>Moulton, William R., 1st Lt.</p> <p>Raczynski, Andrew T., Pvt.</p> <p>Sullivan, John J., Jr., Pvt.</p> <p>2-44 Dewep, Clayton K., Corp.</p> <p>Luttinger, Joaquin M., Pvt.</p> <p>Meier, Frederick B., Pvt.</p> <p>10-44 LaRochelle, John H., Pvt.</p> <p>6-45 Abramson, Harold B., 2nd Lt.</p> <p>Agoston, Peter P., Pvt.</p> <p>Antonich, Kenneth G., 2nd Lt.</p> <p>Armenante, Antonio A., Pfc.</p> <p>Avallone, John C., A.C.</p> <p>Ayer, William H., A.C.</p> <p>Bachelder, Millard N., Pvt.</p> <p>Bain, James, Jr., 2nd Lt.</p> <p>Balas, William, Pfc.</p> <p>Baldwin, Louis B., Jr., A.S.</p> <p>Ball, James L., A.C.</p> <p>Banks, John H., Pvt.</p> <p>Barker, Allan M., Pvt.</p> <p>Barnes, James A., Pvt.</p> <p>Barron, Ellis L., Pvt.</p> <p>Beattie, Harry J., Jr., T.Sgt.</p> <p>Beck, Alfred E., Jr., Pvt.</p> <p>Bennett, Edward M., Pvt.</p> <p>Bernan, James K., Corp.</p> <p>Bernstein, Gerald D., A.C.</p> <p>Berry, Warren O., Corp.</p> <p>Blanc, Louis F., Pvt.</p> <p>Bliss, Robert L., Corp.</p> <p>Booker, Ralph W., Corp.</p> <p>Botway, Donal L., Pvt.</p> <p>Boyd, John P., Pfc.</p> <p>Brady, Philip B., Cadet</p> <p>Breed, David E., O.C.</p> <p>Breese, Robert K., Corp.</p> <p>Bresky, Donald R., Corp.</p> <p>Brown, Barton, Pvt.</p> <p>Brown, Curtis H., Pvt.</p> <p>Brown, David W., Corp.</p> <p>Brush, James W., Pvt.</p> <p>Bryant, Thomas V., Jr., Pvt.</p> <p>Buck, James C., Pvt.</p> <p>Burchfield, David J., Pfc.</p> <p>Burrus, Ray C., Jr., 2nd Lt.</p> <p>Burton, Gordon L., 2nd Lt.</p> <p>Butterfield, Charles P., Pvt.</p> <p>Caldwell, Nichols W., Pvt.</p> <p>Cameron, Gordon C., Pvt.</p> <p>Campbell, Donald L., 2nd Lt.</p> <p>Campbell, Mason H., Pvt.</p> <p>Carnes, Edwin H., Jr., Pvt.</p> <p>Carr, Charles E., Pfc.</p> <p>Carter, Wayne, Pvt.</p> <p>Castor, LaRoy N., Jr., Pfc.</p> <p>Chichester, Clinton O., Jr., Pvt.</p> <p>Chudy, Max R., Jr., Corp.</p> <p>Clement, Robert C., 2nd Lt.</p> <p>Clifford, John M., Pvt.</p> <p>Coombs, William F., Jr., O.C.</p> <p>Coons, George F., A.C.</p> <p>Cordner, Frederick W., 2nd Lt.</p> | <p>6-45 Courant, Hans W. J., Pvt.</p> <p>Cowdery, James R., Pfc.</p> <p>Cox, Robert S., Jr., Pfc.</p> <p>Craigie, Hugh A., Pfc.</p> <p>Cross, Henry H., Corp.</p> <p>Cummings, Eustace W., A.C.</p> <p>Daly, Michael J., 3rd, Pvt.</p> <p>Dann, Benjamin G., Jr., Pvt.</p> <p>Davies, Richard L., Pvt.</p> <p>Davis, Arthur S., Corp.</p> <p>Davis, Charles W., Pvt.</p> <p>Davissou, Richard J., Pfc.</p> <p>Day, Joseph P., 3rd, Corp.</p> <p>de Mars, George A., A.C.</p> <p>de Vries, John A., A.S.</p> <p>Diamond, Aaron L., Pvt.</p> <p>Dick, Philip A., Pvt.</p> <p>Dorsey, Leo D., Pfc.</p> <p>Doyle, Matthew J., Jr., 2nd Lt.</p> <p>Dulack, Joseph T., Pvt.</p> <p>Edwards, Alfred E., Jr., Lt.</p> <p>Edwards, Horace L., Pvt.</p> <p>Enos, John L., Pvt.</p> <p>Falabella, Gaetano, Jr., Corp.</p> <p>Farquhar, Robert A., Pvt.</p> <p>Ficarra, Virgil F., 2nd Lt.</p> <p>Floyd, Donald S., 2nd Lt.</p> <p>Fowle, Everett N., 2nd Lt.</p> <p>French, John L., Pvt.</p> <p>Freund, Philip C., Pfc.</p> <p>Frohling, Edward S., Corp.</p> <p>Frye, John R., Pvt.</p> <p>Gaillard, David D., 2nd, Pvt.</p> <p>Gale, Richard P., Jr., Pvt.</p> <p>Gale, John A., Corp.</p> <p>Gerda, John A., Corp.</p> <p>Glenn, Richard E., Lt.</p> <p>Goddard, Murray C., 2nd, Corp.</p> <p>Goppelt, John W., Pvt.</p> <p>Greenlaw, Alden F., Corp.</p> <p>Griffin, Robert W., Pvt.</p> <p>Grisdale, Richard D., Pvt.</p> <p>Gurley, George B., Jr., Pvt.</p> <p>Hallock, Robert W., Mid.</p> <p>Hamman, Robert L., Pvt.</p> <p>Hammond, Elton F., Jr., Corp.</p> <p>Haneman, Vincent S., Jr., Lt.</p> <p>Hartman, Lloyd W., Jr., Pvt.</p> <p>Havener, Arthur R., Jr., Corp.</p> <p>Hellar, Martin W., Jr., Pvt.</p> <p>Helmers, Edward N., Pvt.</p> <p>Henze, Henry L., Corp.</p> <p>Hilton, Thomas L., Pvt.</p> <p>Holzwarth, Charles W., Pvt.</p> <p>Hoyt, Earl D., Pvt.</p> <p>Hulswit, Frank T., Corp.</p> <p>Humphrey, Dean E., Pfc.</p> <p>Humphrey, Harvey J., Pvt.</p> <p>Hunt, Donald M., Cadet</p> <p>Inman, Harry A., 2nd Lt.</p> <p>Irwin, James C., 3rd, Pvt.</p> <p>Jackman, Waldo C., Jr., Corp.</p> <p>Jalbert, Roland A., Corp.</p> <p>Jansen, Hugh M., Jr., Pvt.</p> <p>Jenkins, Donald, Jr., A.S.</p> <p>Jennison, Whitney, Corp.</p> <p>Jones, Harry G., Pvt.</p> <p>Jones, John R., Pvt.</p> <p>Jonsson, Philip R., Pvt.</p> <p>Julian, Paul F., Cadet</p> <p>Kahn, Burton H.</p> <p>Kalette, Denny C., Pvt.</p> <p>Kaufmann, Axel H., Pfc.</p> <p>Keepnews, Lawrence W., 2nd Lt.</p> <p>Kennett, Frank E., Jr., Pvt.</p> <p>Kessler, Ira, 2nd Lt.</p> <p>Keniston, Davis B., Jr., Corp.</p> <p>Kiefer, Jack C., Pvt.</p> <p>Kind, Paul W., Corp.</p> <p>King, Robert L., Pvt.</p> <p>King, Warren J., A.C.</p> <p>Kingman, Donald</p> <p>Klagstad, Robert E.</p> <p>Kralik, John J., Jr., Cadet</p> <p>Krewson, George C., 3rd, Pvt.</p> <p>Kurth, Malcolm H., Pvt.</p> <p>Lacy, Thomas B., Pvt.</p> <p>Lampher, Edward J.</p> | <p>6-45 LaPlace, Robert F., Pvt.</p> <p>Law, Russell L., Jr., Pvt.</p> <p>Leahy, James B.</p> <p>Lehner, Peter</p> <p>Leupold, Mathias J., A.C.</p> <p>Leva, Jerome, Jr., Corp.</p> <p>Levedahl, William J., 1st Lt.</p> <p>Lisk, Norman E., Jr., A.C.</p> <p>Loomis, George P., Jr., Pvt.</p> <p>Loomis, Stan H., A.C.</p> <p>Lopez, George A., Corp.</p> <p>Lowrie, Walter O., Lt.</p> <p>Lutman, Byron O., Jr.</p> <p>Mabe, Joseph L., Pvt.</p> <p>McChrystal, Richard G.</p> <p>McCorry, Francis V., Jr., Pvt.</p> <p>McDonald, Crawford</p> <p>McDonald, Robert A., Pfc.</p> <p>McDonald, William P., Corp.</p> <p>MacFarland, Howard T., Corp.</p> <p>McKibben, Leonard N., Pvt.</p> <p>McLaughlin, Judge</p> <p>MacLeod, William A., Jr., Pvt.</p> <p>McSwiney, Daniel D.</p> <p>Madden, Harry V., Jr., Pfc.</p> <p>Madden, James T.</p> <p>Maley, William B., Pvt.</p> <p>Malkovsky, Robert L., Pvt.</p> <p>Manning, Blair L., Corp.</p> <p>Marshall, Donald, Corp.</p> <p>Marshall, Thomas C., Jr., Pvt.</p> <p>Mason, Lemuel W., Jr., Pvt.</p> <p>Mathews, Charles P., Pvt.</p> <p>Mauck, Frank H., 2nd Lt.</p> <p>Mayo, Edmund C., Pvt.</p> <p>Mead, Charles D., Pvt.</p> <p>Mender, Henry, Pvt.</p> <p>Mergler, Harry W., Pfc.</p> <p>Meyer, Harry H., Jr., Pvt.</p> <p>Millard, Howard L., Lt.</p> <p>Millett, Robert H., Pvt.</p> <p>Mitchell, George W.</p> <p>Mitropoulos, Charles N., Pvt.</p> <p>Morris, James B., Jr., Pvt.</p> <p>Morse, Richard F., Pfc.</p> <p>Mott, Robert R., Pfc.</p> <p>Mueller, Joseph A., Lt.</p> <p>Munroe, Willard N., Jr., A.C.</p> <p>Nagel, James C., A.C.</p> <p>Nahm, Robert E., Corp.</p> <p>Nau, Norman F., 2nd Lt.</p> <p>Nersasian, Arthur, Pvt.</p> <p>Nichols, Charles K., Pfc.</p> <p>Nowell, John T., Pfc.</p> <p>Olsen, Ralph C., Pfc.</p> <p>Orthwein, William C., Pvt.</p> <p>Ostergaard, Paul B., A.C.</p> <p>Pampel, John K., Pvt.</p> <p>Parsons, Richard W.</p> <p>Pearson, Donald L., Lt.</p> <p>Peterson, Robert K., Pvt.</p> <p>Pierce, John B., Pvt.</p> <p>Pigott, Joseph D., Cadet</p> <p>Pitt, William F.</p> <p>Pitts, Wade H., Jr., Pvt.</p> <p>Polimou, John</p> <p>Posthill, Bertin N., Pvt.</p> <p>Pratt, Edward B., Jr., A.C.</p> <p>Pratt, Frederick L., Lt.</p> <p>Raynor, Preston C., Pvt.</p> <p>Reade, Kemp B., Pvt.</p> <p>Rescher, Jay G.</p> <p>Reusswig, Frederick W.</p> <p>Reuter, Howard A., T.5.</p> <p>Revoir, William H., Jr., Pfc.</p> <p>Richards, William B., Pfc.</p> <p>Richardson, Leonard F., Pvt.</p> <p>Richardson, Peter H., Pvt.</p> <p>Rioux, Joseph G., Cadet</p> <p>Robinson, William R., Pvt.</p> <p>Rogers, Edward S., 2nd, Pfc.</p> <p>Rudkin, Henry A., Jr., Pvt.</p> <p>Sadri, Frederick F., Pvt.</p> <p>St. George, Leslie M., Pvt.</p> <p>Salisbury, Glenn C., Jr., Cadet</p> <p>Sawyer, Frederick W.</p> <p>Sawyer, Paul B.</p> <p>Sayles, Francis H.J., Pvt.</p> |
|---|--|--|---|

6-45 Schneider, Frederick R., *Pvt.*
Schuman, John M., Jr., *Cadet*
Shahan, John E., Jr.
Shepherd, Wilson C., *Pvt.*
Shepherd, Edward G., Jr.
Singer, Edward M., *Pvt.*
Skinner, Charles V., *Pvt.*
Skinner, Jacques B., A.S.
Skogstad, Paul H.
Stater, H. Nelson, Jr.
Smith, Charles E., Jr., *Pvt.*
Smith, George H., A.C.
Smith, Verity C.
Smith, William W., *Corp.*
Soule, Chester C., Jr., *2nd Lt.*
Spencer, Fayette P., *Pvt.*
Spiller, William S., *Pvt.*
Squire, Frank C., Jr., *Lt.*
Stagg, Glenn W., *Pvt.*
Stanfield, Norman T., *Cadet*
Stebbins, Robert H.
Stevens, Edward L., Jr., A.C.
Stevenson, John G., *Pvt.*
Stewart, George E., *Pvt.*
Stoessel, Edward P., *Pvt.*
Stroud, William D., Jr., *Pvt.*
Sutherland, John B., *Lt.*
Symonds, William W., *Pvt.*
Thena, Robert H., *Pfc.*
Thomas, Walter B., Jr., A.S.
Thompson, Charles D., *Pvt.*
Thompson, John, A.C.
Tilden, Sydney G., Jr., *Pvt.*
Traknis, Edmund H.
van Ravenswaay, Robert C., *Pvt.*
Vezina, Frederic J., *Corp.*
Vigoda, David W., *Sgt.*
Vitka, Joseph A., Jr., *Corp.*
von Kummer, Ferdinand G., Jr., *Pvt.*
Wallace, William, Jr., *Lt.*
Walton, Robert S., *Lt.*
Wardwell, Theodore M., Jr., *Pfc.*
Watson, Ross O., *Pfc.*
Weber, Dean H., *Sgt.*
Wentzel, Manfred G., *Pvt.*
Wilbur, Harvard L., Jr.
Willenbrock, Arthur, Jr., *Cadet*
Winne, Elwyn E.
Winninghoff, John D., *Pvt.*
Wolfe, John A., *Pvt.*
Wood, George, A., Jr.
Yardumian, Haig S.
Young, Wilbur F., *2nd Lt.*
Yurgelun, Albert A., A.C.
2-46 ★ Newbury, David M., *Pvt.*

U.S.N.

1920 Welch, William G., C.C.M.
1928 Clark, Philip M., *Lt. Comdr.*
1933 Faulkner, Ralford L., *Lt.*
1934 † Gibson, George D., *Lt. Comdr.*
Raphael, Jerome M., *Lt. (j.g.)*
1935 Madden, Robert C., *Ens.*
Orton, Samuel T., Jr., *Lt. (j.g.)*
1936 Jenks, Frank, *Ens.*
1938 Gibson, William G., *Ens.*
1939 Cummings, Herbert K., *Lt.*
de Aragon, Orlando C., *Lt.*
Houssiere, Charles R., Jr., *Lt.*
Mullin, David W., *Ens.*
Quigley, William S., Jr., *(Lt. j.g.)*
Tatman, Edwin M., *Ens.*
1940 Avery, Elizabeth S., *Ens.*
Eberle, Richard J., *Ens.*
Hanken, Arthur E., *Lt.*
Wadman, Alton J., *Lt. (j.g.)*
1941 Hajjar, A. William, *Lt. (j.g.)*
Hayden, Luke S., *Ens.*
Meyers, Irving, *Ens.*
Park, Phocion S., Jr., *Ens.*
Winsor, Allen P., Jr., *Ens.*
1942 Canfield, Norman L., *Lt.*
Collins, John L., S.2c.
Ferguson, Irving S., S.2c.
Seavey, Robert W., *Ens.*
Sutton, Louis V., Jr., *Lt. (j.g.)*
Thompson, George A., Jr., *Ens.*
1943 Angeles, Arthur C., S.1c.
Conside, John M., *Ens.*
Dickson, Frederick S., 3rd, *Ens.*
Downing, Robert C., *Ens.*
Meissner, Robert C., *Ens.*
Newton, Whitney, 2nd, *Ens.*
Otto, Virgil E., S.1c.
2-44 Carpenter, Herbert L., Jr., *Ens.*
Dirnberger, Lawrence A., *Ens.*
Goldey, Robert H., *Ens.*
Reilly, Robert J., *Mid.*
Rush, Frank E., Jr., *Ens.*
Smith, Robert B., S.1c.
10-44 Frothingham, Anthony, S.1c.
Hellmuth, Theodore N., S.1c.
Horsburgh, Robert H., Jr., *Ens.*
Short, Norman S., *Lt.*
Titelman, Edward R., *Ens.*
Wittels, John R., R.T. Sc.
6-45 Atkinson, William G., Jr., S.1c.
Burns, Edward J.
Crawford, Armon D.A., Jr., A.C.
Crowther, Malcolm P., *Ens.*
Davies, Stanley S., A.C.
Divenuti, Arthur L., S.1c.
Doyle, John R., A.S.
Dudley, David D., S.1c.
Duffy, Raymond F., Jr., A.S.

6-45 Gould, Robert M., S.1c
Hahn, Bradley
Jabine, Thomas B., S.2c.
Kelly, Edward H., Jr., A.S.
Ketchum, David D., A.S.
Knerr, Conrad H., S.1c.
Kuhnle, Lewis B., R.T.Sc.
Marsh, Milton F., R.T.Sc.
Miller, Charles R., S.1c.
Mitchell, Paul L., Jr.
Perry, Robert F., Jr., A.S.
Pettengill, Kenneth H., S.1c.
Phoutrides, Aristides S., Q.M.3c.
Reed, Elliott W., Jr., A.C.
Reynolds, William P., *Ens.*
Russell, Frederick A., Jr., A.C.
Russell, Robert G., Jr., A.S.
Sahlin, Richard T.
Santo Domingo, Luis A.
Seropian, Diran M., A.S.
Smith, Robert H., Jr., *Mid.*
Thayer, Garland T., 3rd, A.C.
Thorton, Peter, R.d.M.3c.
Towse, Donald F.
Weslowski, Robert G., Q.M.3c.
Whitmore, Donald S., R.T.Sc.

U.S.C.G.

1935 Berger, Bernard B., *Lt.*
Fernald, John S., A.S.
1936 Eames, Ronald D., S.1c.
Handrahan, John B., *Cadet*
6-45 Marran, Francis L., R.T.Sc.
Parkhurst, Robert D., *Cadet*

U.S.M.C.

1936 Doran, John W., Jr., 1st *Lt.*
2-44 Ufford, Page S., Jr., *Pvt.*
6-45 Artley, James M., *Pvt.*
Clifford, John J., Jr., *Pvt.*
Connelly, Mark E., *Pvt.*
Gijlhann, Robert H., *Pvt.*
Haines, Samuel E., Jr., *Pvt.*
Herbert, John W., Jr., *Pvt.*
McMurtrie, Robert L., *Pvt.*
Madden, Theodore R., *Pfc.*
Manson, James E., *Pvt.*
Milstone, Carroll M., *Corp.*
Moore, George F.D., *Pfc.*
Reardon, John A., Jr., *Pvt.*
Rosser, Keith M., Jr., *Pvt.*
Roy, Wayne, C., *Pvt.*
Snyder, Joris J., *Pvt.*
Sprague, Donald R., *Pfc.*
Taggart, Rush, Jr., *Pvt.*
Van Abs, Arno W., *Pvt.*
White, George R., Jr., *2nd Lt.*

AUSTRALIA

Army

1913 Lemaire, Lionel H., *Col.*

CHANGES IN RANK

U.S.A.

1911 Kerr, C. Phillips, *Lt. Col. to Col.*
1919 Hill, Edmund W., *Lt. Col. to Maj. Gen.*
1922 Walke, Roger S., *Capt. to Maj.*
1923 Drazen, Michael, *Lt. to Capt.*
Nisley, Harold A., *Col. to Brig. Gen.*
1925 Franks, John B., *Col. to Brig. Gen.*
1926 Billings, Lyman, 1st *Lt. to Capt.*
Rosser, Bernard P., *Maj. to Lt. Col.*
1928 Dempewolf, A. Starke, *Capt. to Maj.*
Root, Howard S., *Capt. to Maj.*
1929 Crandall, George A., *Maj. to Lt. Col.*
Richardson, Donald W., *Sgt. to T.3.*
1930 Batchelder, Donald F. P., *Pvt. to Brig. Gen.*
Gailey, Charles K., Jr., *Col. to Brig. Gen.*
Jandris, Ludwig P., 1st *Lt. to Capt.*
Spahr, William H., *Capt. to Maj.*
1931 Buckingham, Burdette H., *Maj. to Lt. Col.*
Smith, H. Sheldon, 1st *Lt. to Capt.*
1932 Condie, Churchill C., *Corp. to Sgt.*
Hurd, C. Judson, *Corp. to T.4.*
Merrill, Frank D., *Maj. to Maj. Gen.*
Shackelford, James M., *Maj. to Lt. Col.*
1933 Gabar, Harry W., *Lt. to Capt.*
1934 Andersen, James R., *Col. to Brig. Gen.*
Loring, Albert D., *Maj. to Lt. Col.*
Matzkin, Leon, *Pvt. to Sgt.*
1935 Besson, Frank S., Jr., *Col. to Brig. Gen.*
Epstein, Leo F., *Lt. to Capt.*
Fraser, William B., *Lt. Col. to Col.*

1935 Kelakos, Michael G., *Capt. to Maj.*
Lane, Stanley M., *Capt. to Maj.*
Parker, James D., *Maj. to Lt. Col.*
1936 Call, William A., *Lt. Col. to Col.*
Grindell, John R., *Capt. to Maj.*
Hickman, Richard E., *Capt. to Maj.*
Holman, Charles R., *Capt. to Maj.*
1937 Barrett, Frank J., T.5. to T.4.
Fitzpatrick, John P., T.3. to S.3pt.
Hartmann, William E., *Lt. to Maj.*
Matthews, Norman A., *Maj. to Lt. Col.*
1938 Au Werter, Jay P., *Capt. to Maj.*
Heinemann, George A., A.C. to 2nd *Lt.*
Lohman, Ira H., Jr., *Capt. to Maj.*
Robinson, Clark S., Jr., *Lt. to Capt.*
Welling, Alvin C., *Lt. Col. to Col.*
1939 Courland, Raphael H., *Pvt. to 2nd Lt.*
Dennis, Albert P., Jr., *Capt. to Maj.*
Donatello, Dominic G., *Lt. to Capt.*
Morabito, Sylvester, *Pvt. to Corp.*
Weeks, Joseph R., Jr., *Lt. to Capt.*
1940 Isaacs, Irving W., *Sgt. to 2nd Lt.*
Kridel, Norman T., *Lt. to Capt.*
McEvoy, John P., *Capt. to Maj.*
Miller, Robert G., *Lt. to Capt.*
Schneller, George O., *Sgt. to T.3pt.*
Valukonis, Alfons, 1st *Lt. to Capt.*
Wilmarth, Clarence M., *Capt. to Maj.*
Young, Mancoog S., *Pvt. to T.5.*
1941 Cole, Charles B., *Lt. to Capt.*
Cook, Arthur C., *Capt. to Maj.*
Fish, David H., *Capt. to Maj.*
Hartshorne, Pierre F., 1st *Lt. to Capt.*
MacLeod, John H., Jr., *Lt. to Capt.*
Moffat, David D., Jr., *Lt. to Capt.*
Montanaro, Anthony, 1st *Lt. to Capt.*
Schwindler, William R., *Lt. to Capt.*
1942 Brady, Eugene J., Jr., *Lt. to Capt.*
Franklin, Joseph, *Lt. to Capt.*
Frye, Clifton, 2nd *Lt. to Capt.*
Hinchman, John, 2nd *Lt. to 1st Lt.*
Kellogg, William W., 1st *Lt. to Capt.*
Kluger, Arnold F. A., *Maj. to Lt. Col.*
Kunz, Robert C., 1st *Lt. to Capt.*
Marsilius, Newman M., Jr., *Capt. to Maj.*
Perry, Robert B., *Lt. to Capt.*
1943 Angell, Burton S., 2nd *Lt. to 1st Lt.*
Brewster, Spencer H., A.C. to 1st *Lt.*
Lee, Munny Y. M., O.C. to 1st *Lt.*
Steen, Stephen N., O.C. to 2nd *Lt.*
Walcott, Henry R., Jr., 2nd *Lt. to 1st Lt.*
2-44 Brett, William H., 3rd, *Pvt. to Lt.*
Cummings, Robert H., *Pvt. to 2nd Lt.*
Markus, Alvin A., *Pvt. to 2nd Lt.*
Martin, Jay J., Jr., *Pvt. to 2nd Lt.*
Michaels, Alan S., *Corp. to 2nd Lt.*
Plachta, Robert A., O.C. to 2nd *Lt.*
Woodburn, James, 3rd, A.C. to 2nd *Lt.*
10-44 Katz, William E., *Pvt. to S.3pt.*
Kuebler, Thomas L., *Pfc. to T.3.*
MacLean, Alan L., *Pfc. to Lt.*
Ransom, Victor L., *Pvt. to Lt.*
Schwartz, Martin D., A.C. to 2nd *Lt.*
Steffens, Charles, Jr., *Pvt. to T.4.*
Stout, Joseph D., Jr., A.C. to 2nd *Lt.*
6-45 Sabel, Robert H., A.C. to 2nd *Lt.*

U.S.N.

1923 Baumeister, Werner W., *Lt. to Lt. Comdr.*
Noble, Albert, *Capt. to Rear Adm.*
1924 Fahrian, Frank G., *Comdr. to Rear Adm.*
1926 Woodason, Morton P., *Lt. Comdr. to Comdr.*
1927 Harrison, Richard E., *Lt. to Lt. Comdr.*
1929 Adams, Scarritt, *Lt. to Comdr.*

1930 Fahrney, Delmer S., *Comdr. to Capt.*
Rehler, Joseph E., *Lt. Comdr. to Comdr.*
1931 Cook, J. Franklin, *Lt. (j.g.) to Lt. Adm.*
1932 Henderson, Frederick R., *Lt. (j.g.) to Lt.*
Smith, LeRoy, Jr., W.O. to C.W.O.
Wilkinson, Edwin R., *Lt. Comdr. to Capt.*
1935 Haley, Herbert P., *Lt. to Lt. Comdr.*
1936 Burns, Joseph A., *Ens. to Lt. (j.g.)*
1937 Bowen, Harold G., Jr., *Lt. Comdr. to Rear Adm.*
Clement, Donald G., P.O.1c. to C.C.M.
1939 Jamison, Will B., *Ens. to Lt. (j.g.)*
Shubart, Harry S., *Ens. to Lt. (j.g.)*
Zeldin, Camille A., A.S. to S.2c.
1940 Lowry, David F., *Ens. to Lt. (j.g.)*
1941 Butman, Robert C., *Ens. to Lt. (j.g.)*
Fawkes, Emerson E., *Lt. to Comdr.*
1942 Bowers, Lawson L., *Cadet to Lt. (j.g.)*
Lacey, John W., *Ens. to Lt.*
Meurk, Carl R., *Ens. to Lt. (j.g.)*
Navin, Robert E., *Ens. to Lt. (j.g.)*
1943 Brockett, William A., *Lt. Comdr. to Comdr.*
Davis, Waldo F., Jr., *Ens. to Lt. (j.g.)*
Goodfriend, Morton J., *Ens. to Lt. (j.g.)*
Gordon, Norman J., *Ens. to Lt.*
Lenzner, Israel Z., *Ens. to Lt. (j.g.)*
Scott, Howard H., *Ens. to Lt. (j.g.)*
Thomas, Torrence R., *Ens. to Lt. (j.g.)*
2-44 Crowley, Joseph C., S.2c. to S.1c.
Marenholtz, Pete E., *Mid. to Ens.*
10-44 Horrigan, Robert V., A.S. to *Ens.*
McLaurin, King H., Jr., *Mid. to Ens.*

U.S.C.G.

1939 Sharp, Henry S., *Lt. Comdr. to Comdr.*
1942 Davis, Harry E., Jr., *Lt. Comdr. to Comdr.*
2-44 Tonner, Richard C., F.C.3c. to F.C.1c.

U.S.M.C.

1926 Jacob, John B., *Maj. to Col.*
1941 Parry, Robert T., 2nd *Lt. to 1st Lt.*
1942 Hassey, John T., *Corp. to Lt.*
2-44 Baker, Maitland A., *Sgt. to S.3pt.*

CANADA

Army

1939 French, Felix L., *Pilot to Flight Lt.*

RANKS NOT PREVIOUSLY PUBLISHED

1940 Braun, Jennings, 1st *Lt. U.S.A.*
1943 Broderick, James C., 2nd *Lt., U.S.A.*
2-44 Wagnan, Joel L., 2nd *Lt. U.S.A.*
10-44 Spruill, Cecil E., *Lt., U.S.A.*

CASUALTIES

1917 *Gorrell, Edgar S., *Col., U.S.A.*
1918 *McVicker, Lansing, *Col., U.S.A.*
— Luxembourg.
1932 *Burr, Leland M., Jr., *Lt. Comdr., U.S.N.*—from wounds following action in the Pacific.
1934 †Gibson, George D., *Lt. Comdr., U.S.N.*
1937 *Bartlett, David B., 1st *Lt., U.S.A.*
—on a troopship while being transferred as a prisoner of war from the Philippines to Japan.
1940 †Van Schaik, John, *Sgt., U.S.A.*
1941 *Campbell, Thomas C., Jr., *Capt., U.S.A.*
†Van Tuyl, Richard A., 2nd *Lt., U.S.A.*—Austria.
2-44 *McClave, James S., *Ens., U.S.N.*
*Schutte, George A., *Lt., U.S.A.*
—Luxembourg.
10-44 *Hann, Vincent R., *Pfc., U.S.A.*
—in France after having been wounded in Belgium.
†Phillips, James L., *U.S.A.*
2-46 ★ Newbury, David M., *Pvt., U.S.A.*
—Germany.

★ Killed in Action

† Missing in Action

‡ Prisoner of War

* Died or Killed in Service

** Wounded

ALUMNI AND OFFICERS IN THE NEWS

Achievement

¶ By GORDON R. WILLIAMS '29, who has won the James Laurie prize of the American Society of Civil Engineers "for the best paper describing an accomplished work of construction" with his paper entitled "Drainage of Leveed Areas in Mountainous Valleys."

¶ By DARD HUNTER, staff, who has won the 1944 Ohioana Medal awarded by the Martha Kinney Cooper Ohioana Library in recognition of his contribution to the art of bookmaking.

New Departures

¶ For GEORGE R. LORD '10, as vice-president in charge of manufacturing, and for GEORGE H. TABER, JR., '13, as president, of the Sinclair Refining Company.

¶ For FRANCIS B. SILSBEE '10 and HERBERT G. DORSEY '39, as vice-presidents of the Washington Academy of Sciences, representing respectively the Washington sections of the American Institute of Electrical Engineers and of the Institute of Radio Engineers.

¶ For RALPH M. FERRY '12, as manager of Tennessee operations, with headquarters at Alcoa, Tenn., for the Aluminum Company of America.

Written

¶ By KARL T. COMPTON, President, in *Science* for March 2, "Research Board for National Security."

¶ By HENRY A. FISKE '91, in the *Quarterly* of the National Fire Protection Association for January, "Sprinklers Provide Safety to Life from Fire."

¶ By CHARLES G. ABBOT '94, in *Science* for March 9, "Sir Isaac Newton and the Sensitive Radiometer."

¶ By CARLE R. HAYWARD '04, in the *Engineering and Mining Journal* for February, "Minor Metals Livest Topic In Non-ferrous Metallurgy."

¶ By PHILIP B. BUCKY '20, in the *Explosives Engineer* for January-February, as the sixth in a series, "Block Caving at Emma Nevada."

¶ By PERCY BUGBEE '20, in the *Quarterly* of the National Fire Protection Association for January, "Fire Protection Developments in 1944."

¶ By O. KENNETH BATES '21 and George Hazzard, in the Industrial Edition of *Industrial and Engineering Chemistry* for February, "Thermal Conductivity of Alcohols and Glycols."

¶ By PHILIP H. HATCH '21, a series of three articles pertaining to Diesel engines, in the *Railway Mechanical Engineer*: for January, "Diesel Repair Facilities"; for February, "Diesel

Mechanical Repairs"; and for March, "Diesel Electrical Repairs."

¶ By ROBERT S. TAYLOR '23, in *Refrigerating Engineering* for March, "Heat Operated Absorption Units."

In the Wake of War

¶ AUSTIN W. HIGGINS '20, a colonel in the Army Transportation Corps recently appointed to the staff of the commanding general in the Third Port Area, Africa, has general supervision of rail, truck, water, and air transportation for North Africa and is also president of the general court of the area.

¶ ANTONIO C. KAYANAN '42 has resigned as chief city planner of the Cleveland Regional Association to introduce modern city planning in the villages of his native Philippines, "where most of the houses are shacks made of the palm leaf," with the objective of raising community life there in 15 years to the level of that in small United States towns.

¶ KRAUSE A. IGNACIO Y SORIANO '43, also taking part in the Philippine rehabilitation program, will direct restoration of water and sewage systems.

Speakers

¶ The Rev. F. HASTINGS SMYTH '14, on February 18 about "Religion in the Soviet Union" as the third lecture on life in the Soviet Union in a series sponsored by the Massachusetts Council of American-Soviet Friendship, Inc.

¶ CASIMIRO LANA-SARRATE '18, on October 10, under the auspices of the Institute of Industrial Studies and Lectures of the Argentine Association of Manufacturers in Buenos Aires, on the problem of technicians in Argentine postwar industry. Dr. Lana-Serrate described rather fully the facilities and opportunity to be had at M.I.T., by way of inspiration for the new "Faculty of Exact, Physical and Natural Sciences" contemplated in Buenos Aires. A reprint of his lecture contains a flattering number of pictures of the Institute on the Charles.

¶ ALBERT G. DOWNING '42, from the Marianas over the radio program, "Soldiers with Wings" on December 9. Captain Downing and DONALD A. NORTON '42, also a captain in the Army Air Forces, were both mentioned in an article entitled "How's the Weather Up there?" appearing in the *Elks Magazine* for February.

¶ GEORGE R. HARRISON, Dean of Science, M.I.T., on "Light — Visible and Invisible" on January 14; BERTRAM E. WARREN '23, Professor of Physics,

M.I.T., on "The Crystalline Structure of Matter" on February 11; OTTO C. KOPPEN '24, Professor of Aeronautical Engineering, M.I.T., on "Post-War Aircraft, Private and Commercial" on March 11; FREDERICK K. MORRIS, Professor of Geology, M.I.T., on "Earth, Moon, Man and Time" on April 8 — all parts in a series of illustrated public lectures on the general subject, "Certain Aspects of Post-War Developments in Science and Engineering," presented by the Boston Public Library in co-operation with Technology at the library on Sunday afternoons.

DEATHS

* Mentioned in class notes.

¶ RUSSELL G. FESSENDEN '89, February 11.

¶ ARTHUR D. KINSMAN '89, February 5.

¶ JOHN W. GLIDDEN '90, June 10, 1941.*

¶ CHARLES H. ANDREWS '91, January 5.

¶ FRANK I. DAVIS '92, August 21.*

¶ J. SCOTT PARRISH '92, February 20.*

¶ JOHN H. GARDINER '95, February 22.*

¶ LEO GOODKIND '92, December 14, 1943.*

¶ MERTON L. EMERSON '04, February 8.*

¶ FRANCIS C. THOMAS '96, September 24.*

¶ ERVING R. GURNEY '99, September 14, 1943.*

¶ WALTER C. CHAFFEE '00, January 20.*

¶ HENRY F. CAUSEBROOK '04, February 1, 1942.*

¶ PRESCOTT D. HOARD '04, November 10.*

¶ JULES E. WHITE '04, September 23.*

¶ WALTER WHITMORE '04, September 13.*

¶ HARRY P. TREVITHICK '09, January 17.*

¶ SYDNEY I. SNOW '10, January 16.*

¶ GEORGE E. ROBINSON '12, January 16.*

¶ HENRY S. TIRRELL '12, January 29.

¶ MARVIN J. DODD '15, December 27.*

¶ FRANK R. FOSTER '15, January 22.*

¶ ROGER W. PARKINSON '25, September 26.*

¶ BESHARA E. BATTIT '34, October 11.*

¶ HAROLD C. MCKAY, JR., '34, March 4.

¶ WILLIAM G. CRAGIN '36, February 25.

¶ SAMUEL BRECK '40, September 4.*

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

Indiana Association of the M.I.T.

On the 14th of February, 18 members of the Association met in the private dining room of the Apex Grill in Indianapolis for their regular monthly meeting. The dinner was followed by the business section of the meeting, during which our President, Stanley C. Boyle '27, appointed a nominating committee to submit their nomination of officers at the March meeting of the Association, when the election of officers will be held. The members appointed to the nominating committee were J. Lloyd Wayne, 3d, '96, H. S. Morse '03, and John H. Babbitt '17. It was decided to hold future meetings of the Association at the Apex Grill, until further notice.

Our guest speaker was D. J. Angus of Esterline-Angus Company, Indianapolis, who spoke on "The Propulsion of Water-Borne Craft." His talk, complete with excellent blackboard illustrations and diagrams, not only covered the propulsion of various types of ships but also included other interesting phases of ship design. The fundamentals of ship stability and the basic shapes of hulls for sailing vessels, merchant ships, and warships were very well presented and in such a manner as to make these subjects easily understood and most interesting. A detailed comparison of paddle-wheel versus propeller propulsion was made, and many questions were asked on this particular point after the talk. In fact, the question period lasted a full hour with no end in sight, when the meeting was of necessity adjourned, the length of the discussion being ample evidence of interest in the subject.

Members who attended the meeting were as follows: J. H. Babbitt '17, F. C. Balke '14, C. L. Bouchard '36, S. C. Boyle '27, J. M. Cosgrove '22, A. H. Clarke '15, A. B. Ellenwood, Jr., '34, Russell Fanning '30, T. G. Harvey '28, H. C. Karcher '25, M. D. McCuen '40, Malcolm Mitchell '28, J. J. Monagle '35, H. S. Morse '03, A. C. Rood '21, R. V. Taylor '23, and J. L. Wayne, 3d, '96. — THOMAS G. HARVEY '28, *Secretary*, Monarch Steel Company, 545 West McCarty Street, Indianapolis 7, Ind.

M.I.T. Club of the Province of Quebec

A luncheon meeting was called for February 7 at the Windsor Hotel to greet Professor F. J. Adams, who is in charge of the Course in City Planning of the M.I.T. School of Architecture. He was to be in Montreal to give a lecture sponsored by McGill University. At the last minute Professor Adams had to call off his trip and lecture because of illness, which we regretted not only for ourselves but for him also. We went ahead with our luncheon plans, however, and had the satisfactory attendance of 32. With no notice at all,

Paul Kellogg '11 of Stevenson and Kellogg, Ltd., management engineers, gave us a very interesting talk on management accounting. So good a talk was it, without notice, that we wondered what he might have done had he had time to prepare an address.

At a previous meeting it had been decided to ask the members of the Club to pay two dollars as dues. The response was very hearty: 48 members responded immediately, thereby providing funds which will be used to further the interest of the members and the Club. It was particularly gratifying to have a number of out-of-town members who are not likely to be able to attend any of the meetings send in their checks. — STANLEY C. DUNNING '17, *Secretary*, Canadian Waterpaints Limited, 2100 St. Patrick Street, Montreal 22, P. Q., Canada.

Technology Club of Philadelphia

As the climatic event of several months' preparation, the January 23d dinner meeting at the Bellevue-Stratford gave Philadelphia Technology men distinguished entertainment and a concrete set of proposals for future action. The meeting was part of a long-considered plan to sell Philadelphia on M.I.T., its prestige, and its graduates, so that when Philadelphians read of a Technology Club meeting, they will think of it as a gathering of great distinction. To this end we were very fortunate in having as our guest speakers Eric Hodgins '22, Editorial Vice-president of Time, Inc., and Professor John E. Burchard '23, Director of Libraries. These men were accompanied at the head table by: Philip M. Alden '22, manager of retail sales, Philadelphia Electric Company; Herbert W. Anderson '15, President, Fidelity Machine Company; Walter J. Beadle '17, First Assistant Treasurer, E. I. du Pont de Nemours and Company; Arthur C. Dorrance '14, President, Campbell Soup Company; Charles L. Gabriel '12, Vice-president, Publicker Commercial Alcohol Company; Greville Haslam '15, headmaster, Episcopal Academy; Edward J. Healy '23, Vice-president, Philadelphia Brewing Company; Dugald C. Jackson, Jr., '21, lieutenant colonel, United States Army; Dale Purves '23, Vice-president, John B. Stetson Company; Earl J. W. Ragsdale '10, chief engineer, Edw. G. Budd Manufacturing Company; Henry E. Rossell '15, President, Cramp Shipbuilding Company; and Lewis P. Tabor '22, commander, United States Navy, Washington, D. C.

Advance reservations made it appear necessary to assign tables in an effort to alleviate congestion. Printed name cards, an alphabetical list of reservations indicating the table assigned, and an additional mimeographed list of occupants arranged by table numbers were prepared. It is the hope of the committee that criticisms of this procedure will be expressed, so that future policy may be determined. Unless we

are advised to the contrary, prearranged seatings will be the practice only at large meetings. Sheet music of Technology songs and the words of the Stein Song were placed at each plate. We are indebted to Chick Kane '24, who gave the Club recordings of the Tech songs, to Bill MacCallum '24 for the installation of the music amplification, and to Ed Healy for his donation of an M.I.T. banner and the service of a singing pianist. Punch was served before the meeting so that old acquaintances could be renewed, and the Stein Song was sung by all before dinner. (Volunteers with an aptitude for song leading are earnestly solicited.) After a delicious dinner, the meeting was opened by President Healy with the singing of "Sons of M.I.T."

Greville Haslam, headmaster of the Episcopal Academy and chairman of the scholarship committee, reported that after considerable correspondence and a number of personal interviews the scholarship committee held its meeting on last May 25 at the Racquet Club. The committee consisted of Stose, Logan, Healy, Alden, Anderson, and Haslam, with Dean Lobdell sitting in. A dozen and a half candidates were interviewed, and the Regional Scholarship was awarded to John Looney Cowan of Upper Darby High School. The committee made strong recommendations to the Institute regarding the allocation of regional scholarships, with the result that sums ranging from \$200 to \$400 were awarded to seven other candidates, one of them a girl. The total amount involved, including the original Regional Scholarship, was \$2,600.

Robert E. Worden '36 related the activities, to date, of our newly formed placement planning committee, which has been set up to permit the Alumni in the Philadelphia area to make as great a contribution as possible to the placement and rehabilitation of veteran Alumni returning from the battle fronts and to the placement and vocational guidance of graduates and Alumni in the years to come. The men most actively interested in the development of this program are, in addition to Worden, the following: Philip M. Alden '22, Herbert W. Anderson '15, Walter J. Beadle '17, Francis J. Chesterman '05, Edward J. Healy '23, Henry W. Jones '26, Edwardes S. Petze '28, and George E. Whitwell '15. The Club has been impressed with the field work done by the Honorary Secretaries in co-operation with the Director of Admissions. It has seemed to us that a similar decentralization of activity would be equally profitable in the field of placement. Considerable correspondence has developed between our placement planning committee and Nathaniel Sage '13, director of the Division of Industrial Coöperation, and with Ray Stevens '17 of the Alumni Association. As we understand the situation, however, the detailed plans have not yet been completely worked out, or approved, at the Cambridge level. Among other things, Worden pointed out, the Club is

extremely enthusiastic to "get going." It was emphasized that members of the placement planning committee in Philadelphia are eager to do everything possible to set the program in motion. We stand ready to assist Cambridge in whatever ways may be suggested up there. Naturally, we do not wish to proceed until an approved pattern has been set by the folks at the Institute. Our thought on the whole program is based upon our opinion that Technology needs to take a more serious view of the development of its Alumni after graduation. We spend a great deal of time in preadmission selection and in maintaining a desirable set of standards throughout the four years at the Institute. On the other hand, we have not, to date, done a creditable job of "follow-up." In conclusion, Worden again stressed the Club's enthusiasm and impatience to get started and promised that his committee would continue to follow-up with Mr. Sage's office in Cambridge. Beyond this, he asked for specific suggestions, recommendations, and criticism from the membership. He would undoubtedly favor extending this invitation to all the readers of *The Review*. We, in Philadelphia, should like to help set the pace for constructive nation-wide activity in the development of Technology men in all walks of life. Alumni in the Philadelphia area wishing to avail themselves of the services of the placement planning committee or desirous of reaching specific members of the Club will find the Club listed in the Philadelphia directory — JEFFerson 0642.

S. K. McCauley '41, chairman of the nominating committee, proposed for 1945 the following officers and committee members, who were unanimously accepted: President, Herbert W. Anderson '15; First Vice-president, George T. Logan '29; Second Vice-president, Charles W. Stose '22; Third Vice-president, Oden B. Pyle, Jr., '16; Secretary, Edward S. Petze '28; Assistant Secretary, Harold Boericke, Jr., '44; Treasurer, Wendell N. Currier '31; Assistant Treasurer, Howard C. Lawrence, Jr., '38; executive committee — Philip H. Chase '09, senior member, Edmund A. Whiting '15, René A. Pouchain '17, Edward J. Healy '23, William H. Wannamaker '30, Clarence W. Farr '33, Robert E. Worden '36, Samuel K. McCauley '41.

Our retiring President, Ed Healy, to whom this Club owes so much for his tireless and constructive effort and guidance, turned the remainder of the meeting over to President Anderson with a thought that should provoke sincere concentration and formulate planning: "We now have our officers and executive committee for another year. Before I actually become one of the past presidents of the Technology Club, I want you to know that I have felt deeply privileged to be the head of the Club for the past two years. I hope I have succeeded in some small way in advancing the interests of this Club and, of course, through the Club, the interests of the Institute itself. It was very fortunate for me that I came after Phil Alden, who was most able as president and most helpful after he retired. The Secretaries — first, George Logan (now First Vice-president) and later, Ed Petze — worked diligently and whenever necessary. To all the other officers and committee members I extend my thanks for their many suggestions and close co-operation. An-

other fortunate circumstance for us during the last two years was the fact that Frank Chesterman was president of the national Alumni Association, in addition to being a life member of the Corporation. We have also had readily available, when possible, other present and past Corporation members such as Walter Beadle, Buck Dorrance, and George Whitwell, who have been most gracious and kind. During the recent past we have established the practice of rather frequent meetings of officers and committee members between regular meetings, for discussing and forming plans, and I heartily recommend that this plan be continued.

"We are all familiar with the mental drill accomplished by the study of mathematics. We can also realize that the most involved scientific or mathematical hypotheses are evolved, not by doing something grandly inspired in one flourish, but painstakingly and with utmost attention to every detail, by developing within limits the infinitesimally small increment. In other words, the engineering graduate has had the mental drill. He can also have the mathematical method — the method of making big things from little things, leaving no gaps — if he will. The training in calculus that one gets at the Institute is enormously useful as an approach to any one of life's difficulties. The system is to chop up a problem into a great number of indefinitely small elements, to tackle each element separately, and then to summate the results between sharp limits. A man so trained can do anything, so long as he tackles small enough elements and channels his energies between sufficiently narrow boundaries. But, on the human side, probably not too much has been done about the engineering student or the engineering graduate. We are all coming to realize more and more the importance of getting along with people and that engineering must have its carefully developed human side. Many of us have been very much interested in remarks by people from the Institute who point out that additional emphasis will be placed on the humanities in undergraduate curriculums, when education becomes normal. Such clubs as ours can help on this human side. It is hoped that other alumni clubs will think similarly about these opportunities.

"I am very happy to turn the meeting and the presidency over to a very capable and a very human fellow — Herbert W. Anderson."

After a few of his characteristic pleasantries, Andy introduced Professor Burchard in his infectiously genial manner.

Professor Burchard's address was a comprehensive report on the present policy and future plans of the Technology library system. To meet the intensive needs of the peak-capacity student load after the war, many new books will be bought which can be counted on to contribute toward making the Institute's libraries even more useful as centers for academic and industrial research.

The increase in space which will be required makes the present Central Library even more inadequate, particularly since the big dome was never designed for library use. The projected new building, then, will be built at the earliest economical time, since the plans have been drawn

and other arrangements are all ready to be set into motion. Besides space for the scientific books, the building is to include provisions for many diverse cultural activities such as an auditorium and stage, music rooms and recreational reading halls, all of which will allow the fullest practice of the Institute's broad new program in humanities. It was a great privilege for Philadelphia Alumni to hear of the Institute's library policy from the policymaker himself.

While not specifying Eric Hodgins as a monument to the approach by calculus, the inference was this — that here is a man who has made a success of himself in a far-flung field; he, then, is living proof that Technology training can give its recipients a great and diverse adaptability. As an account by a Technology man who has made good in an alien field, Eric Hodgins' talk made uncommonly good listening. Much of it explained the editorial purposes of *Time*, bringing out that a weekly magazine must necessarily analyze news as well as report it. Such a form of journalism, then, has a stern duty to perform in order to be impartial, with a dispassionateness which is necessary if a free press is to be maintained. During the question period, Eric added to this, saying that *Time* attempts to be impartial, while *Life* states the editorial beliefs of the Time, Inc., organization. The troubles encountered in getting the magazines out in the face of censorship, a manpower shortage, and a paper restriction are very great and add many grave new obstacles to meeting a tight dead line. The mechanics of writing, printing, and distributing the trio of magazines was told in the glittering prose of a polished journalist, making Eric the most articulate Technology man this writer has ever had the pleasure of hearing. Some of the more facetious questions were answered in Eric's own inimitable way.

The meeting, which was attended by 207, including 49 guests, was adjourned with the singing of the Stein Song. Technology men in attendance are listed by classes: 1902: Frank D. Allen; 1905: Claude A. Anderson; 1907: Hermann W. Mahr; 1910: Philip W. Burnham, Karl D. Fernstrom, Earl J. W. Ragsdale, Vahan P. Yacoubian; 1911: Carl A. Schafer; 1912: Charles A. Cary, Charles L. Gabriel, Hugo H. Hanson; 1913: William G. Horsch, Robert W. Weeks; 1914: Arthur C. Dorrance, Alfred P. Kirchen; 1915: Herbert W. Anderson, Henry F. Daley, W. Findlay Downs, Greville Haslam, Kenneth T. King, Henry E. Russell, Solomon Schneider, Edmund A. Whiting; 1916: Mark Aronson, Oden B. Pyle, Jr., Edward A. Weissbach; 1917: Chester K. Allen, Alfred K. Alt-house, J. Justin Basch, Walter J. Beadle, Garland Fulton, Francis Goodale, Kenneth L. Harper, Osgood W. Holt, René A. Pouchain, Harry S. Toole; 1918: Donn Burton, Carl A. Lindgren, Jr.; 1920: Hobart O. Davidson; 1921: Sanford J. Hill, Dugald C. Jackson, Jr., Winfield S. Libbey, A. Abba Orlinger, J. Trevor Peirce, Ralph M. Shaw, Jr.; 1922: Philip M. Alden, James H. Allen, Henry S. Dimmick, Thomas Gill, Joseph Greenblatt, Norman J. Greene, Hugh D. Haley, Bennett Myers, Dexter N. Shaw, Charles W. Stose, Lewis P. Tabor, Lawrence S. Vadner; 1923: Edwin M. Goldsmith, Jr., Edward J. Healy, Robert

L. Hershey, John B. Nason, Jr., Paul R. Plant, Edmund S. Pomykala, Dale Purves, Roy G. Rincliffe, Fred H. Travers; 1924: Robert W. Barker, Earle S. Bates, Norman D. Linley, William H. MacCallum, Charles M. Phelps, Jr., Wilmot G. Peirce, Jr., William C. Ridge; 1925: Charles B. Weiler; 1926: Martin J. Bergen, Albert M. Gates, Howard Humphrey, Henry W. Jones, A. Howard Lane, John K. Sumner, Franklin E. Washburn; 1927: James B. Castner, Joseph W. Hammond, Henry E. Muhlenberg, Philip G. Rhoads, Charles F. Sweet, Jr.; 1928: Maynard A. Babb, Charles E. Berry, Robert M. Harbeck, William S. McClintic, Edwardes S. Petze, Charles H. Topping; 1929: George G. Cudhea, Donald R. Funk, George T. Logan, V. G. Miskjian, Leonard C. Peskin; 1930: Thomas F. MacLaren, Curtiss S. McCune, Hugh J. Mulvey, Norman F. O'Shea, John W. Patton, Granger D. Schrader, William H. Wannamaker, Jr.; 1931: Wendell N. Currier, Louis P. Evans, Willis Fleisher, Jr., Henry Grinsfelder, F. Arthur Lutz, Charles P. van Gelder; 1932: Frank S. Chaplin, George W. Falk, Eugene B. McBride, Martin T. Meyer, C. Jack Stover, Joseph Valverde, Jr.; 1933: Richard M. Armstrong, Philip A. Coleman, Clarence W. Farr; 1935: William H. Brockett, Charles H. Ross, John M. Teasdale; 1936: John S. O'Connor, William F. Ramsay, Frank C. Simonds, Robert E. Worden; 1938: James A. Emery, Jr., Howard C. Lawrence, Jr., Frederick E. Ray, Herman Schaevitz; 1939: Philip W. Constance, Gail H. S. Swan, Frank W. Tobin, Jr., Lawrence B. Woolaver; 1941: Roger G. Blum, William R. Burke, Samuel K. McCauley, Robert C. Montana, Carl W. Streed; 1942: Alvin C. Waggoner; 1943: Maryalice C. Moore, Charles J. Swer; 1944: Harold Boericke, Jr., William D. Bowman, Nels R. Nelson. — EDWARDES S. PETZE '28, *Secretary*, Scott Paper Company, Foot of Market Street, Chester, Pa. HAROLD BOERICKE, JR., '44, *Assistant Secretary*, 5932 Overbrook Avenue, Philadelphia, Pa.

Technology Club of Rhode Island

The Club has recently held three very interesting meetings. The first was at the Metacomet Golf Club, where Henry B. Kane '24 gave his interesting talk entitled "The Wild World," and Raymond Stevens '17, President of the Alumni Association, discussed activities of the Association. As both subjects have been presented in these columns, no further comment will be made.

The Providence Engineering Society, the American Institute of Electrical Engineers, and the Technology Club of Rhode Island held a joint meeting at the Providence Engineering Society's auditorium, where James D. McLean '37 aroused a large audience to enthusiasm on the subject of "Post-war Television." The dinner preceding the meeting was held at the University Club.

Our latest assembly, at the Rhode Island Yacht Club on February 21, consisted of a ladies' night, with many couples enjoying dinner, bridge, games, and dancing.

Lloyd C. Eddy '09 writes as follows: "Whether sanity involves knowing the bearings of one's home or not, I am now at a latitude of about 42 degrees and a longitude of 71 degrees, with mail address of 597

Willett Avenue, Riverside 15, R.I. Licensed patents for his own inventions having expired, this author and engineer has prepared a book manuscript which he hopes can solve the world's biggest problem in case he gets enough gain without being too greedy. Although he prefers profitable writing to free scribbling, a surmise either solved or dissolved under his hair is to the effect that harmony and variety are better spices for life's supersoup than sticking to a cobbler's last, at least while trying to preserve (not pickle) health and contentment amid mass production of Jap beetles and other aircraft (or what not?). The solution in that book manuscript, somewhat like unpatented inventions or secret-ballot votes, is not for free information. Despite much good censoring of collectivism at present, people in postwar days may discourage tyrannical collectivists and imperialistic cartels from unfairly appropriating to their own political advantages the finest fruits of individualism, those peoples not conspiring with greedy blocs to cause lodged leaders to produce more wars." — DONALD E. WALCH '22, *Secretary*, General Electric Company, Industrial Trust Building, Providence, R.I.

Technology Club of Rochester

Carrying on the tradition of a Christmas luncheon, a small group from the Technology Club met at the University Club on Friday noon, December 29. In past years this has been the occasion for a gathering of Alumni with the Rochester delegation of students at Technology. This year the accelerated pace of Institute life left no time for holidays, and none of our students had more than a fleeting glimpse of Rochester and home this winter.

Hoping to have some of our servicemen at home for Christmas, the Club made an attempt to reach and invite all who might be here that day. Holiday furloughs seemed scarce, however, David Lull 10-44 being the only guest we found. He was greeted by that portion of our military contingent stationed in Rochester and presented to the Club by President Donald B. Kimball '20. Discussion consisted principally in the exchange of information and news about those who could not attend. David Lull and John Ancona '03, chairman of the scholarship committee, were the chief contributors.

Those who attended were as follows: Harold E. Akerly '10, Sydney Alling '11, John F. Ancona '03, Arthur H. Bond '15, James S. Bruce '39, Henry R. Couch '20, C. King Crofton '22, Edward S. Farrow '20, Howard S. Gardner '30, Donald B. Kimball '20, Frederick J. Kolb, Jr., '38, Kenneth J. Mackenzie '28, Edmund H. Miller '23, Harold L. Smith, Jr., '39, Robert E. Smith '33, William Staudenmaier '41, Robert H. Thompson '39, Paul B. Wesson '98, and Charles F. Wray '95. — FREDERICK J. KOLB, JR., '38, *Secretary*, Building 14, Kodak Park, Rochester 4, N.Y.

Washington Society of the M.I.T.

The Washington Society has lost one of its most active and best-known members in the death of Merton Leslie Emerson '04, which occurred on the night of the last meeting of the Society. Major Emerson was

chairman of the executive committee at the time of his death and had just finished four terms as president. For over 20 years he had represented the Washington Society on the Alumni Council, and in many other ways he had identified himself with Technology men and affairs in Washington.

Major Emerson, also known as "Judge" because of his dignified bearing and position as referee for the Maryland, Virginia, West Virginia, and North Carolina district of the Social Security Board, helped organize the Chemical Warfare Service gas defense during World War I and was New England director of the National Recovery Act before coming to Washington as a consultant and member of the technical board of review of the Public Works Administration. He took an active interest in bringing many Technology men to Washington in various capacities in the early days of the depression.

For years he struggled with the operating troubles and political fortunes of the American Pneumatic Service Corporation, which took him to the principal cities of the East and made him a frequent visitor to Washington because of the post-office tube systems maintained by his company. He finally became president of the parent organization, the Lamson Company. The details of his professional activities are described in "Who's Who." His wife, Frances, daughter Mary (wife of Lieutenant Tom Mechling), and granddaughter survive him in Alexandria, where he had lived for the last six years.

* * *

Those Technology men who were in the capital on the second Thursday of February, the 8th, and failed to look up the Washington Society at the Y.W.C.A. at 6:30 missed one of the best gatherings we have had for several years. It was a live session from start to finish. You don't have any trouble remembering where we are because it is such an apparently incongruous place for Tech men — the Y.W.C.A. But the food is good, the hall well suited, and the crowd congenial for young men from the classes of the Nineties as well as those from the Forties. Second Thursdays — look us up.

We are becoming a club of singers if you can judge by the song fest on Thursday. Harry Fisk '22 got us to singing "Sons of M.I.T." with different tables competing for volume. It sounded loud, but good. Whatever anyone wants to sing or have the crowd sing, Joe Gaffney '28 always comes up at the piano with a swell accompaniment, in addition to the musical background he provides before dinner and at intermission. President Bill MacMahon '22 didn't introduce our guest this time, but turned that pleasant duty over to John Nolen '20, Vice-president. For the second time since I can remember, our guest was not a man. Our first woman speaker was Mrs. Roosevelt, last year. This time Nancy Hay of the Johnson O'Connor Research Foundation told the story of aptitude testing as practised by her organization in New York. It's hard to tell whether Miss Hay held our attention by her message, her expert speaking ability, or her charming manner and appearance, but the boys really paid attention, and I did hear, after the meeting, that several were making plans

even then to go to New York to have their aptitudes investigated right away.

Miss Hay told of Johnson O'Connor's work in aptitude testing at General Electric in 1922, when these human engineering studies were first started, and how, in the subsequent quarter-century, the base on which the findings of the Foundation are built has broadened to tens of thousands of tests. Not only that, but there has been a chance to check on the predictions as the people grow to success 10 to 20 years after the Foundation pointed out to them their best paths. The idea is that each of us has aptitudes that we may or may not recognize in their relative importance. By scientific tests, expertly administered, these aptitudes can be discovered. On the basis of the findings we can be told in what field of activity we shall be most successful, and in what division of that field. For example, the famous wiggly block will furnish an index of our ability to visualize in three dimensions. The nine pieces of the block can be assembled in half a minute by some people, but only after a 20-minute fight by others. If we clock a minute or so on this test, we might do well in engineering work. Other tests register our aptitude for accounting, inductive reasoning, structural visualization, pitch, proportion, design, observation, finger dexterity, vocabulary, and so on for 23 tests. The time we shall spend at the tests is about six hours, after which Miss Hay and her associates know more about us than we know ourselves.

The importance of vocabulary was stressed by Miss Hay. She said that successful executives in any business will be found to have a high rating in the Foundation vocabulary test. It's not so much big words that interest the tester as precision in the meanings of the words we all think we know. Of the examinees registering high in the vocabulary test as high-school students, some 80 per cent are successful executives after 10 years. This test is the only one that correlates well with success in the executive field. Miss Hay reminded us that there are three factors affecting our success at any job — aptitude, skill from experience, and knowledge. If our job is not suited to our aptitude, we have to rely on the others for our living. But if our aptitude is also given a chance to pull with the other two, we shall realize our fullest capabilities, and incidentally, or perhaps not incidentally, we shall make more money. As I said before, a number of the fellows feel it their duty to take the battery of tests as soon as possible. We must have been interested in the subject to keep up a rapid fire of questions for three-quarters of an hour. If you are in Washington next month, join us at the usual place and time.

Present were the following Alumni: 1890: J. G. Cranc; 1891: W. B. Douglass; 1892: B. P. Du Bois; 1893: P. H. Thomas; 1896: J. W. Clary; 1897: P. L. Dougherty; 1900: E. G. Allen; 1903: W. L. Cook; 1904: A. M. Holcombe, F. W. Milliken, G. N. Wheat; 1905: E. T. Steel; 1909: E. D. Merrill; 1911: W. H. Martin; 1912: A. M. Pedersen; 1913: R. M. Wilson; 1915: A. D. Beidelman; 1917: J. P. Ferrall; 1919: A. H. Blake, L. J. Grayson; 1920: John Nolen; 1921: L. W. Conant, J. A. Mahoney; 1922: R. H. Blatter, H. H. Fisk, G. R. Hopkins, W. K. MacMahon, C. A. Moore, J. R. Morton, Jr., J. H. Teeter, R. K. Thulman;

1923: S. E. Duran-Ballen, S. S. Elkins; 1924: Henry Shore; 1925: H. B. Swett; 1926: S. J. Cole, T. L. Soo-Hoo; 1927: E. G. Cowen; 1928: C. A. Armstrong, A. E. Beitzell, J. W. Gaffney, G. D. Mock; 1929: N. P. Stathis, F. W. Turnbull; 1930: A. F. Bird, C. W. Maskell; 1931: E. S. Worden, Jr.; 1932: F. M. Moss, A. M. York; 1933: C. W. Bohrer, J. F. Longley; 1934: J. F. Burke, A. M. Vaughn; 1935: Herbert Small; 1936: J. T. Cox, Jr., H. F. Lippitt; 1937: G. B. Hunter, Jr.; 1939: J. H. Ferry, Jr.; 1942: Z. W. Wilchinsky. — FRANK W. MILLIKEN '04, *Secretary*, 613 North Greenwich Street, Falls Church, Va. ALBERT F. BIRD '30, *Assistant and Review Secretary*, 5070 Temple Hills Road, Southeast, Washington 20, D.C.

CLASS NOTES

1887

Our esteemed President, Dick Schmidt, writes that if travel conditions do not improve in the next few months he will be compelled to forego his contemplated trip to Boston next June, but he adds somewhat reassuringly: "I may not have the will, however, to resist my desire to be with the old guard." He writes that he met Lonsdale Green at the monthly M.I.T. Alumni meeting on January 24, which was attended by about 60 men, mostly young men, he says, "who treat us oldsters with respect." Dick also says: "We have a large amount of work now and ahead, so much that we have taken about 3,000 square feet of office for three years from May 1, in addition to the 4,000 we have now; so you see that the business I began nearly 50 years ago has continued to grow."

The latest change of address to reach the Secretary is that of Frank E. Shepard, who is now located at 1120 East Tenth Street, Apartment 11, Denver 3, Colo. Your Secretary deeply regrets the dearth of class news of late, although this is to be expected after 58 years of postgraduate life. Any communication is always welcome, whether long or short, and keeps alive the old class spirit always so typical of '87. — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

1888

Howland Chandler, one of our famous architects, sends in the following snappy letter: "I have been in architecture, either with a partner or alone, since my early days with Hartwell and Richardson in the last century. Several skeleton frame buildings in Boston, some hospitals, churches, libraries, schools, houses, piggens, garages, dog kennels, as well as some marine camouflage in World War I, all mixed with a few ups and plenty of downs, have kept me reasonably busy, ever since. At present, I am out at pasture, having a most pleasant time, doing all kinds of plain and fancy work in the mighty good engineering department of this fine town of Needham."

Our grapevine reports that Ivar Sjöström, our class promoter, is working on his memoirs, which will be published in the not too distant future and will contain some sensational information about the Class.

Although Fred Ellis was graduated in Mechanical Engineering, he built thousands

of miles of concrete highway in New York State and then settled down in his home town of Melrose, Mass., to become superintendent of public works and rear a family of three beautiful girls, one of whom was elected to the New Hampshire legislature from Melvin Village. Architecture and building are Ellis' side lines. During the last few years he has built an apartment to live in himself at Melvin Village, also a carpenter shop, icehouse, tool house, and two hog houses, one with two apartments and one single. In 1897 he designed and built a two-and-a-half-story house in Melrose, with a flower garden of 300 lineal feet of beds five feet wide, in which the flowers bloomed from early spring till frost came. He took entire care of this garden for 15 years. His victory garden is at Melvin Village, where with the help of his grandson he raises 20 kinds of vegetables.

Fred Nichols' new address is 1116 East Mount Vernon Avenue, Orlando, Fla. — Your Secretary recently attended a luncheon meeting of the Trenton section of the American Society of Mechanical Engineers held at the Hotel Hildebrecht; 42 members of the Society were present. — The big storm of last December raised a tide 10 feet higher than usual at Chebeague Island. My 12-foot boat was thus carried out to sea and lost. — BERTRAND R. T. COLLINS, *Secretary*, 39 Wiggins Street, Princeton, N.J. SANFORD E. THOMPSON, *Assistant Secretary*, The Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston 15, Mass.

1890

A private dining room at the Statler Hotel in Boston has been reserved for luncheon on June 23 for Alumni of 1890 and as headquarters for our 55th anniversary. This is the date of Class Day exercises at M.I.T. and of the annual Alumni Dinner, to be held at the Statler the same evening.

The Secretary's list now consist of 77. About one-half of these live in New England, and it is hoped that even with present conditions we can get a pretty good number together to reminisce, and to tell what we have been accomplishing in the last five years. Of this total, 38 are graduates and 39 were specials and nongraduates. This is the first time the latter have exceeded the graduates in number. Throughout our earlier years the losses were greater among the nongraduates, and at the time of our 50th reunion, with a total of 108 on the list, there were 61 graduates and 47 nongraduates.

It was a great pleasure to hear from Burdett Moody with a cheerful letter and accompanying photographs of the Class and of some of the professors, especially in Course I, and with a copy of the 1890 "Technique," which latter we never have had in our files. These will be on exhibition at the Statler, and we hope that someone will identify all the pictures. Moody writes that he "had these all picked to take back to the 50th reunion but something came up to spoil it — a regret which still lingers," in which we all join, but we look forward to seeing him at the 60th, if he cannot make the 55th. — The Secretary is pleased to announce that since the last notes two additional contributions to the Alumni Fund have been received from members of our Class, so that we are now

well over the top in both numbers and dollars.

Notice has just been received of the death of John W. Glidden on June 10, 1941, at his home in De Kalb, Ill. From a local paper we learn that on leaving Technology "he was instrumental in the organization of the De Kalb Electric Lighting, Heating and Power Plant, being the first to introduce electricity in that community, and was superintendent of the De Kalb-Sycamore Interurban Railroad. Later he became affiliated with the Libby, McNeill and Libby firm of Chicago, packers and jobbers, being in charge of the electrical work in connection with the construction of plants and warehouses in all parts of the country. During the last years of his life he had operated his farm at De Kalb and the greenhouses at the Glidden farmhouse. He was survived by his widow, Mabel Carter Glidden, three sons, and two daughters. Glidden was a native of De Kalb and, as a member of one of its most prominent families, had played an active part in the development of the community." — GEORGE A. PACKARD, *Secretary*, 50 Congress Street, Boston 9, Mass. HARRY M. GOODWIN, *Assistant Secretary*, Room 4-242, M.I.T., Cambridge 39, Mass.

1892

Congratulations are due Spencer Hutchinson on his induction into the Legion of Honor of the American Institute of Mining and Metallurgical Engineers at the annual meeting in February. This honor is bestowed upon members who have been associated with the organization for 50 years. Incidentally, it should be mentioned that Ralph Sweetser became a member of the Legion of Honor in February a year ago. Owing to lack of information no mention was made of this in our class notes at the time. I am glad to report that Hutchinson is steadily improving from his recent illness and expects to be out again in another month. — Henry Dresser reports a change of address to 111 Main Street, Southbridge, Mass. Dresser visited the Institute last fall, but the Secretary was away at the time and regrets very much missing the opportunity of having a chat with him.

We have just received the sad news of the death of J. Scott Parrish at his home in Richmond, Va., on Monday, February 20, after an illness of several months. He was elected president of the Class in January, 1943, to succeed the late William R. Kales who had served the Class as president since its graduation. A native of Richmond, Parrish made his home there all his life. He attended the Richmond public schools and, after a preparatory course at the Norwood School, entered the Institute in the fall of 1888 and in 1892 was graduated with the S.B. degree in Mechanical Engineering. He was married in 1893 to Edith Winch of Brookline, Mass., who died in 1942. He is survived by a daughter, Mrs. Robert T. Barber, Jr., and a son, J. Scott Parrish, Jr., both of Richmond.

Immediately after graduation from Technology he began his long and active business career in Richmond in the Richmond Cedar Works, a company founded by his father, serving first as assistant treasurer and afterwards as treasurer for many years. Among other business interests acquired in later years were the Economy Concrete

Company of Virginia, the Hammond Company, the Richmond Foundry and Manufacturing Company, the Wilks Veneer Company, and the Gulf Red Cedar Company, of which he became president. He had also been a director and treasurer of the Chesapeake Corporation and the Albemarle-Chesapeake Company, Inc., at West Point, and a director in the Albemarle Paper Manufacturing Company in Richmond. In later years he was president of the Chesterfield Apartment Company in Richmond.

He served for three successive terms as president of the Richmond Chamber of Commerce, beginning in the year 1924, and as chairman of the State Port Authority in 1934. He had been a director of the Virginia State Chamber of Commerce from its foundation in 1924 until the time of his death. He was a member of the Grace Street Presbyterian Church in Richmond and took a leading part in the merging of the old downtown church with the new uptown congregation known as the Church of the Covenant, playing an important part in the erection of the handsome Grace-Covenant Presbyterian Church on Monument Avenue. He was a member of the board of Union Theological Seminary and trustee of Hampden-Sydney College. Both he and his wife had been charter members of the Edgar Allan Poe Foundation.

The following article quoted from the Richmond *Times-Dispatch* brings out the qualities of Scott Parrish as a public-spirited citizen, our classmate and friend: "Few men made so important a contribution to Richmond's business, civic, cultural and religious growth during the twentieth century as J. Scott Parrish, whose death has just occurred, after a long and agonizing illness. As first president of the Richmond Community Fund, he was a pioneer in bringing the people of the city to a sense of social responsibility. As president of the Richmond Chamber of Commerce for three terms he was one of the most dynamic and effective leaders that organization ever had. As chairman of the State Port Authority he was responsible for important advances in the development and expansion of Hampton Roads. As chairman of the Richmond Committee on Economic Development he was a leader in preparing this community for the dislocations of the postwar era.

"Mr. Parrish was as interested in cultural and religious matters as he was in his business and industrial connections. His presidency of the Wednesday Club was among the evidences of his concern for music. He was one of the leading laymen of the Presbyterian Church, and was not only a key figure in the affairs of his own congregation, but he served on several important institutional boards. A gracious host who liked nothing better than to entertain his friends at his Monument Avenue home, or at his 'Miniborya' estate in Chesterfield County, Mr. Parrish was a businessman and industrialist of extraordinarily wide interests. Virginia is a better State for his having lived in it, and Richmond has been the gainer in many ways from his wise counsel and his progressive leadership. A deeply religious man, he faced his fatal illness with the same courage and faith which he had shown in all other relationships throughout his life."

Notices have also been received recently of the death of two more of our classmates in Course IV: Frank I. Davis of Hartford, Conn., who in recent years had organized the Davis Travel Service, and Leo Goodkind, who had been connected for many years with the firm of Schunemans and Mannheimers in St. Paul, Minn. — CHARLES E. FULLER, *Secretary*, Box 144, Wellesley 81, Mass.

1894

An event of great interest, from the standpoint of the writer, took place about the 25th of January when the oil portrait of the Class Secretary was delivered at the office of the President of the Institute. This portrait, given to Technology by the Class and executed with splendid artistry by H. Bingham Ballou, Jr., of Medford, now hangs in the outer office of the President, but will eventually find its home in the headquarters of the new Department of Food Technology. It is a pleasure to report that the portrait is eminently satisfactory to the family, friends, and former staff associates of the subject and is unanimously regarded as one of the best executed and most carefully studied portraits hanging on the walls at Technology. The Secretary's association with the painter during the many sittings was a very pleasant one. No wielder of the brush could have been more considerate, more careful of details, or more honest in expressing the characteristics and features of the sitter. It is certainly to be hoped that other portraits of Technology men may be painted by him, for he has a rare faculty of catching the salient features and the individuality of those who pose for him, as well as a co-operativeness and friendly understanding with those who are brought under the spell of his skill and the special knowledge of his art. The Secretary and his family will ever be extremely grateful to the Class for the great honor which the presentation of this portrait confers, and especially to Alan Claflin, who acted as chairman of the committee, and to Leonard Tufts and Albert Tenney as members. It may be of interest to some to know that the painting represents the Secretary as seated, garbed in academic dress — the gown and hood of a doctor of science, the honorary degree conferred by Bates College in 1923. In his right hand he holds the Appert Medal, received in 1943 at the June meeting of the Institute of Food Technologists, for outstanding service in that field of applied science. Thus the portrait accents some of the high points in his 50-year career at M.I.T.

Alan Claflin is largely responsible for the items presented in these notes. It gave the Secretary great pleasure to attend a luncheon in honor of Captain Philip Wadsworth Claflin, Alan's second son, now in a highly responsible position in the Intelligence Division of the United States Army with headquarters in Paris. Captain Claflin made a hasty flight to America about the first of the year and on January 4 was married to Agnes Millicent Rindge, professor of art at Vassar College. The marriage took place at the Military Ordinariate on Madison Avenue and was followed by a wedding breakfast at the Carlyle. Mrs. Claflin holds the degrees of A.B., M.A., and Ph.D. from Radcliffe, is president and a trustee of the American Federation of Arts, and is a consultant

of the Museum of Modern Art. Captain Claflin has been on overseas duty for more than three years in Iceland, England, and France. He is a graduate of Exeter and of Harvard, and before entering the Army as a private in 1941, he was assistant treasurer of the Discount Corporation of New York. He is now assigned to the counterintelligence branch of General Eisenhower's European Theater Headquarters and returned to Paris after a brief leave, during which he and his bride spent several days with Alan and his wife at Winchester.

Claflin has also reported that George Sherman's son is a lieutenant colonel in the Air Forces, at present in India. George's son-in-law is also a lieutenant colonel in the Air Forces and at the time the information was obtained was in France. It would be of interest to know how many of '94's sons and grandsons are in service. Claflin has a grandson in the Army. Mrs. de Lancey's son is a lieutenant commander in the Navy. The Secretary's two sons are in civilian war work. Robert, M.I.T. '32, is an engineer and for the past two years has been in charge of several projects at the Naval Ordnance Laboratory in Washington. Before that he was for a year or so at Pearl Harbor, having arrived there on December 8, 1941, the day after the attack. Samuel, M.I.T. '33, was for three years in the inspection division of the Waterbury Tool Company and for 18 months was assistant to the chief inspector of fire control equipment for battleships. He has recently joined the war work engineering forces of the Raytheon Manufacturing Company in Waltham. There are doubtless many other sons of '94 men in direct war work in or out of the armed forces. Horatio Parker is carrying on his extensive work in the Health Department at Jacksonville, Fla., which has doubtless been much increased during the war period.

Sterling Cousins has recently changed his address from Larkspur to 1526 E Street, Eureka, Calif. Under date of February 8 of this year, Charles Abbot has brought out an interesting paper on the 27.0074-day cycle in Washington precipitation. Observations over many years have shown that in general certain preferred days are more likely than others to give markedly increased rainfall over the remaining days; but of course he does not claim that these are the only days when rainfall may be expected. Abbot's contribution to the art or science of forecasting has been notable for many years.

The Secretary is about to make a hasty visit to California and points en route in connection with his position as chairman of the board of directors of the Refrigeration Research Foundation, which has practically a score of research projects in operation in institutions widely scattered throughout the country. While in California he hopes to see Jack Nowell, Ray Price, Austin Sperry, and possibly others of the Class. If he is successful, a report will be made in later notes. — SAMUEL C. PRES-COTT, *Secretary*, Room 3-233, M.I.T., Cambridge 39, Mass.

1895

A letter from Fred B. Cutter '98 of New York City informs us, with no details as yet, that our good classmate, John H. Gardiner of 10 Clinton Place, Mount

Vernon N.Y., had passed away on February 22. When we get further information, we will report it. This is the only news to date. — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass.

1896

The dinner meeting of the classmates around New York was pulled off according to schedule at the President Tavern on Lexington Avenue, on Tuesday evening, February 20, and reached a high point in these annual gatherings, with an attendance of 15, which included Bakenhus, Arthur Baldwin, Dorrance, Freedman, G. C. Hall, Locke, Melliush, Partridge, Rockwell, Rutherford, Sager, Stevens, Tilley, Trout, and Richard Allen, who was considered to be there as stand-in for his father, Mark Allen. Rockwell and Locke had gone over to New York for the occasion. Melliush had come from Poughkeepsie, where he is working with the State Board of Health.

Arthur Baldwin had been in New York for some time, back in harness again for the International General Electric Company, which is being investigated by the Department of Justice in Washington for forming international cartels acting in restraint of trade. From Arthur's long residence in Paris as vice-president of the International General Electric Company, his knowledge is of great value in this case. It does seem most unfortunate that in these times, when every effort should be bent to the prosecution of the war, the Department of Justice in Washington should badger industrial organizations, causing a lot of time and effort to be spent by their officials. According to Arthur all arrangements in regard to international cartels were given the green light in Washington in past years when the contracts were made, and it is hard to understand how Washington can reverse itself when it has once given its approval.

The meeting was run by a triumvirate consisting of Bakenhus, Sager, and Tilley. Admiral Bakenhus took care of all the advance publicity. Sager was the financial man, who handled accounts and the collection of the money, and Tilley was the real chairman of the meeting who kept order. Richard Allen is now located in Connecticut, after having been discharged from the service, and he had been visiting Boston the week before the meeting. When it was found that he would be in New York that night, it was only natural to have him join us. He said that his father had been taking life rather easily after his operation of last year and had reduced his activities somewhat this winter. Sager had had a cold a week or so before the meeting, and since he did not desire to lose out again this year because of illness, as he did last year, he had been taking very special care of that cold. Rutherford came in from Long Island and brought with him some very interesting natural roots he had dug up, which were very lifelike in their resemblance to various animals. Partridge reported that he had had the misfortune of a fire in his trailer where he was living in Jericho. This had occurred early in January, and he had escaped at 7:00 A.M. in zero weather. The fire was quenched, but the interior was badly damaged, so that Partridge had to seek other living quarters. He announced with glee that he had saved his old ser-

mons, which were in a tin box, and he hoped that when warm weather comes he will be able to get the trailer repaired and live in it again. Dorrance came on from New Haven for the occasion. Will Coolidge wrote from Schenectady that although theoretically retired, he was just as busy as ever and would be unable to attend. Dan Bates' secretary wrote that Dan, or, as she titled him, "Colonel Bates," had gone to Arizona on a holiday early in December and was planning to be in California most of February. Ruckgaber, who has usually been present at these annual gatherings, had subscribed to Wagner's Ring operas, and unfortunately the last one occurred on February 20, and he did not want to miss it. It was fine to see Dr. Freedman, as he had been one of the men who had not been a regular attendant. Paul Litchfield had written that he would like to attend, but he was leaving Akron for the Pacific Coast on February 20. No replies were received to the invitations sent to Gayler, C. H. Hall, C. P. Lynch, Starr, and Stoughton. The party wound up at the early hour of 11:00 P.M. so that all could get to their homes, and after having met for the third or fourth successive year in the private dining room of the President Tavern it was agreed that the group owed a lot to John Tilley for having discovered the place for our meetings.

Bakenhus had an interesting report concerning the committee for the dinner-smoker of the American Society of Civil Engineers. They desired to have a fencing demonstration and asked Reuben to assist them. He had Georgio Santelli, a great professional and his fencing teacher at the New York Athletic Club, arrange it all. There were about 1,000 men present at the dinner plus about 250 ladies who came to the gallery to see the entertainment. At the request of the committee Reuben introduced the fencers, and to give recognition to the ladies he told them that in the fencing tournaments of long ago there was always a queen of love and beauty, thus endowing all those present with the honor of being individual queens. When the exhibition of foil, *épée*, and saber fencing was over, Santelli discovered he had about five minutes more, so he asked the audience whether they would like to see Admiral Bakenhus do some fencing. In response to the resultant demand Reuben took off his coat and vest, obtained a saber, and had a saber lesson from Santelli. Reuben said the audience did not seem to think the old man had it in him, but he feels that he put on a good performance and thoroughly enjoyed the informality of the event. The result was that he was highly elated and his spirits were so improved that he has hopes of living through another year without mishap. George Seabury, the secretary of the American Society of Civil Engineers wrote a fine, complimentary letter to the Admiral as director of the Society telling him what a sportsmanlike thing it was for him to take off his coat and give a real saber exhibition.

A letter to the Secretary from Lloyd Wayne in Indianapolis dated January 28 was most interesting in setting forth in detail how some members of our Class were related to Wayne, and how some of them came from Cincinnati, so that Wayne was well acquainted with them. These included

Dave Beaman, who was the uncle of George Merryweather, and also of Jake Strader. George Lawson was one of the boys of the neighborhood, and Billy Andrew went to high school with Wayne. He does not think that he knew Billy Anderson before becoming acquainted with him at the Institute. Although Wayne is retired, he says that he seems to be busy, and at the time he wrote he had not finished the writing of all the acknowledgments of Christmas letters. Wayne is also doing a good job with the reactivation of the Indianapolis Technology Club.

The Boston papers in the week of February 19 reported that the expected axe had fallen on Eugene Hultman as chairman of the Metropolitan District Commission. It seems most unfortunate that politics should displace an able, technically trained individual who has had a lot of experience in the various fields of engineering and business involved in the operation of the multi-fold affairs of the metropolitan district and replace him with a man whose main qualification is that of being a Democrat, but who, according to reports, does not possess the qualifications for the office that Hultman possesses. The *Boston Traveler*, in commenting on the matter, said that the displaced Commissioner was very unfortunate in that, having served the city and state for nearly 40 years, he was left without any pension or retiring allowance, and quoted Gene as saying that he might find it necessary to give up his summer cottage in Duxbury, where he had developed the land and planted trees. It may be possible that he will find an opportunity for consulting practice on the adjustment of contracts and appraisals, work for which he is eminently fitted.

The latest word from Myron Fuller came in a letter from him to Frank Hersey dated February 4, while he was still in Rockport, Texas. He was following intently the war developments in the Far East, because in his travels he had become familiar with most of the places mentioned in the war news. Fuller had experienced a warm winter in Texas with thermometers up to 70 or 75 degrees, although there had been several northeast storms, some lasting a week without any sight of the sun and only a little rain. Warm weather had started the local hens laying, so that plenty of eggs were obtainable at a price still up to 45 cents a dozen, which was high for that district. His housekeeper had been away on a visit for several days, and during the interval Fuller had been the cook and housekeeper. The latest decision he had from the local ration board was that he would receive gasoline enough to allow him to drive his car back to Massachusetts, but he was not counting definitely on this, because the ration board had changed its mind more than once in the past. In any event he was definitely going to return to Massachusetts in the spring.

It should interest classmates to know that Frank E. Guptill, Jr., of the class of 10-44 at M.I.T. is an aviation radioman 3/c in the Navy in the Pacific. — A card from Walter Stearns dated February 8 and postmarked Punta Gorda, Fla., conveyed the information that the Stearns couple were having a tough life there, with nothing to do but golf and bridge, sitting in the sun, with plenty of good food and drink.

It will not be long now before they will be heading back north with the warmer weather. — John A. McIlvaine is at 855 Lakeshore Drive in Asheville, N.C.

Announcement has been made that Dr. Coolidge retired on December 31 as vice-president and director of the General Electric Research Laboratory in Schenectady, a position he had held since 1940. There was considerable publicity over this event in various papers, which summarized the high spots of Coolidge's career and his accomplishments with the General Electric Research Laboratory from the time he joined it in 1905 through the ensuing 40 years. He became assistant director in 1908, associate director in 1928, director in 1932, and vice-president and director of research in 1940. In addition to the 83 patents which he holds himself, his guiding influence has accounted for many other scientific triumphs to help mankind. From time to time in these notes the various medals and honors which have been given to Coolidge have been noted.

At the midwinter dinner meeting of the Boston Alumni held in Walker Memorial on the evening of February 26, the Class turned out in good numbers. Those at the '96 table included Damon, Davis, Driscoll with his daughter Clare, Grush, Locke, Rockwell, and Rundlet. Henry Jackson '95 also elected to sit with us, bringing our total up to eight. Myron Pierce, Clem Tower, and Charlie Tucker had also hoped to attend, but at the last minute Pierce found it necessary to go to a meeting in Wellesley, and Charlie Tucker, who had come to Cambridge from North Andover with the intention of attending, was unfortunate enough to make a call on Dr. Rockwell as his physician, and the doctor sent him right back home again because he was still suffering from his recent attack of bronchitis. No word was received from Tower, but probably he found it a little hard to get in on a rainy night from his home in Concord. Eddie Mansfield had thought that he might be present, but apparently his job as publicity chairman of the local Red Cross chapter preparing for the coming drive and his work on a batch of income tax returns kept him at home. George Hatch wrote the Secretary that he had quit going out anywhere in the evening except on very special occasions. He considered it very fortunate this winter that he had retired from the retail fuel business. He and Mrs. Hatch now usually spend about five months in the summer and fall at their farm in Kennebunk, Maine. Henry Hedge is another man who said he had been working pretty hard this winter and consequently was spending most of his evenings at home. Mort Tuttle had another engagement for that night which ruled him out. The Secretary learned from Bob Davis that, like Grush, he is retired from the Telephone Company, and that company has not generally been bringing back men from retirement. Bob is not idle, as he is church treasurer and member of the ration board. Rundlet, who had been retired, has been called back to his old job in the Boston Custom House, where he expects that he will be serving for the duration.

Our classmate Francis C. Thomas passed away on September 24 at his home in Daytona Beach, Fla. For some time he had been suffering from a serious heart trouble.

Thomas was with us as a special student in Architecture for one year. He was the son of Veeder G. and Mary C. Thomas of Oswego, N.Y., where his father was a prominent lawyer. After his year at Technology Thomas studied law, and later architecture, at Harvard. For many years he was popular in the social life of Oswego, where he endeared himself to many. He was widely traveled, well-read, and a most interesting companion. After the death of his parents he lived with his aunt, Miss Florence Pettibone, in Oswego until the two of them moved to Minneapolis, making their home there during the summer and in Florida during the winter.

Here is another of Bob Flood's stories: "When I was at Tech, I lived in St. James Avenue, near Trinity Church where Bishop Brooks preached. My uncle gave me a seat in the church, and I listened to Bishop Brooks all winter. He was a national character. It was a test of stenography to take down one of his sermons. He spoke so fast. It was like listening to good music to hear him. You were tired mentally but feeling fine. Phillips Brooks was the best-loved man in Boston. He was the chaplain at Harvard. They say he saw a light in a students' hall and went up. The fellows jumped. 'Don't,' said the bishop, 'I'll take off my coat.' 'We're sorry, but we haven't a cigar for you, Bishop.' 'Got a pipe?' He smoked a pipe with them. They say he saw a youngster reaching for a doorbell. 'Let me ring it for you,' offered the bishop. He rang it. Then the lad said, 'Now run like the devil.' The bishop told this one: 'I was in the study of a divine in Boston when a youngster came in to sell some kittens. 'Weren't you in my study the other day, offering me those kittens, boy?' 'Yes, sir.' 'And didn't you say they were good Episcopalian kittens?' 'Yes, sir.' 'And now you say they are good Unitarian kittens — how about it?' 'Well,' replied the boy, 'they've got their eyes open now.'"

"I remember Bishop Brooks' funeral. Copley Square was black with people. There were services in every church in Boston. Business was suspended for ten minutes. The streetcars stopped. Six stalwart athletes from Harvard carried the casket on their shoulders. I can see the casket moving out over the heads of the people right now to the curb of Boylston Street. When the funeral was over, they had the church renovated, and the canopy under which the bishop preached was found to be in a precarious condition. If it had fallen, it would have crushed him to death. But the Lord had his eye on that canopy, I think."

Discussion among classmates in New York and Boston indicated the desire to celebrate our 50th anniversary at East Bay Lodge in Osterville, unless conditions should be such as to make a celebration there impossible. Reservation made tentatively by the Secretary for June, 1946, at East Bay Lodge is therefore still standing. The opinion of classmates also is that to commemorate our 50th anniversary there is nothing we can do of greater significance than to aim to make in the year 1946 a real contribution to the Alumni Fund, which would be for the benefit of the Institute. It seems as if the Class in that year might set its goal for at least \$5,000. It is therefore none too soon for classmates to begin to

think on this matter, because the year 1946 is just around the corner, and we want to plan our finances so as to be able to make this extra contribution in our 50th year. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge 39, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge 38, Mass.

1899

Erving R. Gurney of Wappingers Falls, N.Y., died from coronary thrombosis on September 14, 1943. Gurney was a classmate of the Secretary in the Cambridge English High School. He left Technology, I believe, in his sophomore year and at the time of his death was employed by Pratt and Whitney Aircraft as an engineering draftsman. He is survived by a wife Edith, five children, and three granddaughters. One son, a graduate of the Institute in the Class of 1923, is manager of the Louisiana Steam Products Company of Baton Rouge. — BURT R. RICKARDS, *Secretary*, 381 State Street, Albany, N.Y. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston 9, Mass.

1900

Fred Everett in Concord, N.H., sends in a long letter, from which we quote: "I wish it would be possible for me to attend the smoker on February 26, but I shan't be able to get to Boston at that time. Our legislature is in session and keeps us more or less tied down. We have had more snow this winter than any year that I can remember since we have attempted to keep our roads open for the traveling public. But, in spite of the scarcity of labor and of the fact that most of our equipment is old and wearing out, we have kept the roads in fairly good condition, and traffic hasn't been delayed very much. The storm last week in the Portsmouth area did more damage than any previous one in that section, and the streets in Portsmouth and Dover were blocked up two or three days. If you are interested in snow, come up sometime and I will show you some real drifts."

Allen in Washington writes, in part: "I am keeping reasonably busy here. With no time off I am seeing very little of Washington's places of interest. My particular job is keeping track of all hydroelectric generating units manufactured in the United States. Although the output has dropped off greatly in the past two years, there are still many being made, mostly for various countries in South America. I happened to see a copy of the *Engineering News-Record* of February 1 this morning and noted the following item: 'Walter C. Chaffee, 69, engineer and designer, died in Detroit, Mich., Jan. 20. A member of the firm of Bonnah & Chaffee, he was a graduate of . . . Technology.' I presume you remember him as he was on the baseball team. I have no suggestions for any change in the reunion plans. I'm sure that if you have one of the usual type you will have a very fair attendance and an enjoyable time."

From Bill Hart in Montreal came a very nice letter, a part of which follows: "As to suggestions for the committee meeting to be held on February 26, I am afraid I have not a very fertile mind about it. I did enjoy the meeting that we had down on the Cape some years ago. It was a pleasant outing for

me in all respects. As to your query about snow, you would hardly believe the huge volume of snow that we have had this winter. It is packed up in every back yard, street, vacant lot, and any place where you can put snow. With the shortage of labor, it has been more than difficult to keep the roads and sidewalks in good condition, despite the use of very considerable modern equipment with which to deal with the snow. Each day, however, brings us nearer spring, when snow and ice will disappear."

Hapgood writes from his winter home in Lake Worth, Fla., that he is living a quiet life and expects to return north in May. He has five grandchildren now.

A welcome letter from White, Course I, in Riverside, Calif., came in, and we will let Arthur tell it to you: "In reading over the last issue of *The Review*, I note that you are calling on members of the Class for replies and suggestions, and as I have not sent you anything for some time, I can at least send in a letter. Suggestions from me in regard to the proposed reunion would be presumptuous, as I have been away from the East so long that I am all out of touch with conditions there. At the time of each of the previous reunions, I have hoped and tried to attend, and five years ago when it became impossible, I made a vow that, if alive, I would certainly not miss in 1945. War conditions, however, seem to present an insurmountable barrier. Automobile travel is of course out; and all other means of transport are uncertain, uncomfortable, and worst of all unpatriotic. Last winter my wife and I made a short trip to New York to spend Christmas with a son who is a commander in the Navy and was stationed in Brooklyn, and the travel conditions were terrible. No trip like that again for pleasure; but the son was expected to be sent to sea at any time (he is at present in the South Sea area), and his mother must see him first.

"We have five sons and a son-in-law all in the service; they range from the boy who is a commander to buck privates in the Army; two of them were in the Luzon invasion, and the Navy boy is somewhere in the Pacific. My youngest was drafted by the Army, and Uncle Sam put him in West Point — going to make a general out of him, I guess. With a West Point graduate and an Annapolis graduate in the family we ought to be a fighting outfit. With all the boys gone I must get back in the harness more and look after our ranches and make food and citrus juice for the Army. I see none of the Tech men here and know of no news except what I read in *The Review*. I am sorry to read the news from time to time of some of the boys passing on; but we must consider that none of us are young any more, and such breaks are only to be expected even more frequently as the years go by. Remember me to any old friends you may see, and if you or any of the old crowd come out this way, I sure hope they will look me up. We raised a large family and have a large house and are always glad to see friends." — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston 9, Mass.

1904

Our Class has suffered a great loss in the sudden death on February 8 of Merton L. Emerson, better known to us all as Mert.

He had been suffering from a heart ailment for about two months, but was thought to be making progress toward recovery. Since for several years past his home had been in Alexandria, Va., his funeral services were held in the Fort Myer Chapel on February 12, and he was buried in the Arlington National Cemetery with full military honors.

Mert was born in Brockton, Mass., on April 4, 1882. His family moved to Braintree during his childhood and were living there when he entered Technology from Thayer Academy. Throughout his undergraduate years he was extremely popular and exhibited those qualities of leadership which were so evident in his later life. He was prominent in class and Institute affairs, taking part in freshman athletics, and acting as marshal at President Pritchett's inauguration. He served on the Institute Committee from 1900 to 1902 and was a member of the "Technique" Electoral Committee and of the senior Class Day committee. He was Class Orator and also general manager of the Tech Show, "A Scientific King."

He was graduated from Course I and soon afterward entered the employ of the American Pneumatic Service Company, which later became a subsidiary of the Lamson Company, manufacturers and installers of pneumatic tube carriers for mail, cash, and small parcels. He remained with this company until the early Thirties, eventually becoming its president. Since 1933 he had served the Federal Administration of Public Works in Washington, first as a consulting engineer on many projects of various kinds, and later on the construction of large office buildings for several branches of the government. He then became connected with the Social Security Board and at the time of his death was serving as a referee. During World War I he was commissioned a major and served as chief of administration of the gas defense division of the Chemical Warfare Service.

Mert held several positions of trust and importance which were tributes to his ability and character, being president of the board of trustees of Thayer Academy, a trustee of Wentworth Institute in Boston, and a director of the Braintree National Bank. He was a member of many engineering and military societies, as well as social organizations, and at his death was chairman of the board of directors of the Cosmos Club of Washington.

He was always especially active in alumni affairs, serving as a member of the executive committee of the Alumni Association in 1913 and 1914 and as its vice-president from 1921 to 1923. In 1919 he was elected a term member of the Corporation of the Institute, serving until 1924, and in 1919 was chairman of the Endowment Fund committee. He had been a member of the Alumni Council for many years and president of the Washington Society of the M.I.T. In all these offices he displayed the same enthusiasm and executive ability so apparent in him throughout his life, and his efforts contributed in no small degree to the success of alumni affairs.

Such, in brief outline, was the busy and productive life of the man who was our most widely known classmate. His genial personality endeared him to all who met and knew him, and his passing has

taken from us, his classmates, and from many others, a loved and valued friend.

Unfortunately we have other losses to report — Walter Whitmore, general superintendent of motor vehicles of the New England Telephone and Telegraph Company, died at his home in Winthrop on September 13. Walter entered the employ of the Telephone Company in August, 1904, and served for many years in the transmission and plant engineering department, before becoming motor vehicle superintendent. — Jules E. White died at his home in Los Angeles on September 23. Since 1921 he had been associated with the Southern California Edison Company as assistant engineer. He had been in perfect health, but was stricken with a coronary thrombosis, and was ill but a few days. — Prescott D. Hoard died at Mount Vernon, N.Y., on November 10. — Henry F. Causebrook died in Springfield, Mass., on February 1, 1942. It is always a sad duty to be obliged to record the deaths of classmates, and it is a relief to close these notes with some items about the living.

On November 14 Samuel E. Armstrong addressed a meeting of the New England Railroad Club at the Hotel Vendôme in Boston on the subject of "The Function of Maintenance of Way in Railroading." Sam is engineer in the maintenance of way department of the New York Central System, and the published record of his address indicates that he knows all about it.

Milton S. Hershey, who celebrated his 87th birthday on September 13, resigned from three of his important corporations, and his mantle has fallen upon the shoulders of Percy A. Staples, who has been associated with him, particularly in his Hershey Corporation, the Cuban sugar enterprise, for almost a quarter of a century. In 1916 Mr. Hershey purchased an old sugar mill near the present site of Central Hershey, Cuba, and began the growing and refining of sugar. He was thus the first American to manufacture and refine sugar on the premises, and Staples became president and general manager of the business. The Hershey Corporation and allied companies now operate sugar mills at Central Hershey, Rosario, and San Antonio, with a refinery at Hershey. The corporation built a railway to Matanzas, which, with its branches, is electrified for 120 miles and operated for 130 additional miles by steam. It owns 60,000 acres of land, employs thousands of people and, to keep as many of the employees as possible at work during the dull sugar season, has introduced the growing of peanuts for oil and henequen fiber for rope. It would seem that Staples has succeeded to quite a job. But then, a 1904 man is the proper one to select for a big job. — HENRY W. STEVENS, *Secretary*, 1960 Commonwealth Avenue, Brighton 35, Mass. AMASA M. HOLCOMBE, *Assistant Secretary*, 3024 Tilden Street, Northwest, Washington, D.C.

1905

The committee on getting the consensus of opinion of the Class as regards our 40th reunion has been at work now for three weeks conducting a mail campaign. Probably before this news reaches you, it will have announced results, but the Secretary is in a position to know that it will be more difficult to find accommodations for, than enroll, the largest number ever, based

upon post-card expressions. A 40th reunion comes only once in a lifetime, and most of the answers indicated that our men appreciate that. You will be advised as to results and progress. Some kind of a get-together is inevitable.

Louis E. Robbe, I, in sending in his application adds: "After service in the Army for about two and a half years, I was released last August and put on an inactive status and am now back with the City of New York in the Board of Transportation, from which I was on leave of absence during my Army service. It is with some satisfaction that I advise you that I have entered the honorable status of grandfather with two grandsons, both slightly over one year of age. My son is married and was in the Army for nearly three years and was retired about a year ago on account of physical disability. My daughter's husband is in the Army in England, and I am looking forward to his doing his part to assist in finishing up the European war so that he can come back to this country and be with my daughter and their son again."

Harry Wentworth says: "Illustrating how fast minor events move, my oldest boy had been promoted to chief of intelligence before your note describing him as deputy chief appeared in The Review." Bertrand Leroy Johnson, III, has sent us the reprint of an article, entitled "Economic Factors in the U.S. Phosphate Industry," written by him for the October issue of *Mining and Metallurgy*. He adds that he is busy writing annual reports for the Bureau of Mines on phosphate rock, potash, nitrogen compounds, talc, pyrophyllite, and such, and is too busy to get away for a reunion.

S. Atmore Caine, XIII, now priest-in-charge of St. Augustine's Vicarage, Norristown, Pa., bemoans the fact that he will be unable to attend a reunion because of shortage of man power in his profession: "Our jobs call for a 7-day, 24-hour, on-the-spot duty. I haven't been away from the parish for the last three years, even for a day. There are three of us on the staff of St. John's Parish, of which St. Augustine's is a chapel. I'm vicar in full charge of the chapel. We look after the Montgomery County Prison and the State Insane Asylum." Clarence Gage, II, has had a serious operation but was reported by his wife on February 14 to be recovering nicely. His address is 2855 6th Avenue North, St. Petersburg, Fla. — FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston 10, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 71 Newbury Street, Boston 16, Mass.

1906

Like some of the commodities, class news is rather scarce at this particular time. We have a few items, however, which show that we are still on the job.

The December issue of the *Mining Journal* published at Phoenix, Ariz., marked the completion of the 25th year of Charles F. Willis as editor and publisher. Under his management, this magazine has become an outstanding mining publication in the Southwest. — The Secretary acknowledges an attractive New Year's card from Fay, Spofford and Thorndike with a picture of a dog sled, entitled "Engineering at Arctic Air Bases." This was forwarded by Carroll

A. Farwell, I, who is one of the partners in this engineering organization.

The present conditions have apparently interfered with the winter exodus of classmates to Florida. To date, the Secretary has received but one post card from the sunny South — that from Abe Sherman, who forwarded a card from Sarasota under the date of January 12. Abe wrote that he ran into Walter Munroe, VI, who is the district manager at Sarasota for the Florida Power and Light Company. — The Secretary has received a notice of change of address for Charles E. Fogg. He is now recorded as a lieutenant colonel, located at the college of medicine of the University of Vermont, in Burlington. In peacetime, Fogg is a practicing physician in Portland, Maine. — JAMES W. KIDDER, *Secretary*, Room 801, 50 Oliver Street, Boston 10, Mass. EDWARD B. ROWE, *Assistant Secretary*, 11 Cushing Road, Wellesley Hills 82, Mass.

1907

December 17 marked the 25th anniversary of the appointment of Allan R. Cullimore as director of the Newark (N.J.) Technical School and dean of the then newly created Newark College of Engineering. An article in the *Newark Evening News* of December 18 tells of some of our classmate's ideas that have been put into effect during the past quarter-century. Believing that an engineering college should produce good technicians who are also men of strong character and broad vision, he set out to develop in his students a variety of interests correlated with but extending beyond their engineering studies. About 15 years ago the college introduced into its curriculum social and humanistic studies to a large degree, not by teaching nontechnical subjects separately, but by interpreting them in terms of professional engineering. Allan compiled a book entitled, *Through Engineering Eyes*, containing selections from the works of Homer, Aristotle, Chaucer, Samuel Johnson, Franklin, and others, all with direct bearing on engineering and on other interests as well. For example, a boy whose interest is all in engineering is introduced to Leonardo da Vinci through a treatise on mechanical flight, or to Benvenuto Cellini by a description of the technical difficulties of casting in bronze. Allan, now President of the college, is quoted as saying that he believes that the kind of engineer produced by this system is the answer to many of our problems of international relations. He says: "When we go to take our place in the society of nations, our engineers will be sent all over the world. They will have to deal with the educated and cultured people of other countries, and they will symbolize this country to those people. A lack of sensitivity and appreciation of some of the broader values of life, a lack of knowledge of the background and culture of other peoples, will result in failure. If an engineer in South America looks on Simon Bolivar as just another fellow who had a statue made of him, what can he accomplish in Bolivar's country?" Students for both the technical school and the college are preselected with a view to making sure that they are capable of absorbing technical education. Both schools are city supported and state aided, with cost to the students kept as low as possible consistent

with good instruction. When Allan became head of the school, there were 25 daytime students in the college and about 825 attending night sessions in Newark Technical School. Since then two buildings have been added, and enrollment previous to the war was 850 day students and 1,200 at night. Allan was formerly dean of the College of Industrial Science at Toledo, Ohio, and before going to Newark was dean of engineering at Delaware College. He was a major in the Army Sanitary Corps in 1918 and 1919 and now serves as adviser to the War Manpower Commission in the area near Newark.

Sorry, but I have no special news about any other classmate. Won't you send me facts about yourselves or other '07 men, please? — BRYANT NICHOLS, *Secretary*, 23 Leland Road, Whitinsville, Mass. HAROLD S. WENSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1909

We regret to report the passing of another loyal and well-liked classmate, Harry P. Trevithick, V, at the age of 58. Paul, who has known him intimately for years since they have long been closely associated in class activities in the New York area, writes as follows: "Harry P. Trevithick, V, died suddenly on January 17 on his way home from the New York Produce Exchange, where he had been chief chemist since 1917. Harry was graduated from Wesleyan University in 1907 before coming to the Institute, where he took his degree in 1910. His class affiliations were always with 1909. Before joining the staff of the Produce Exchange, he was with the Southern Cotton Oil Company and with the Refuge Cotton Oil Company, as well as with the Department of Agriculture. He became an authority on fats and oils. He had many professional connections, among them the presidency of the American Oil Chemists' Society and of the Association of Consulting Chemists and Chemical Engineers. Two sons and a daughter, as well as his wife, survive him.

"I happen to have felt very close to Harry. He always came to our class lunches, often bringing one of the boys. I knew him professionally, but there are two reasons why I enjoyed Harry's company. He had a delightful avocation as choir director in a local church out on Long Island near where he lived, and I happen to be a devotee of choral music myself. You can take a group of folks who'll never charm anyone by their solo singing, but put them into a chorus, give them the right leader, and you have something! I have always rather envied Harry this gift of his in choir direction. Then Dale Ellis used to ask us out of a summer Saturday for a sail in his yacht at Port Washington, where Dale was the admiral of the club. Lunch was an important item on our agenda. Harry always came, and many times he brought an array of Trevithick 'pasties.' Now I'm sure the Trevithick ancestors were Welshmen, and these pasties may have been the main dish in a hard-working Welsh miner's midday meal. They were a sort of meat pie, and all of us who were lucky enough to go on an Ellis sailing party know how delicious and sustaining they were — in fact, the party was never quite

complete without them. We have lost a loyal and devoted classmate, whom all of us in and about New York will miss. A note of sympathy has been sent to Mrs. Trevithick and the family."

In the January Review, Rudolf Riefkohl, II, belittled his military activities and modestly told us that he had little of an exciting or interesting nature to convey to his classmates. In the February Review, however, under "M.I.T. Men at War" read the "New Commendation." Although repeating in part the foregoing, here is more of the story coming last December from the Headquarters of the Third Service Command in Baltimore, Md.: "Colonel Rudolf W. Riefkohl, assistant to the Third Service Command chief of staff and a graduate of . . . Technology in 1909, has been awarded a Service Command Certificate of Commendation for 'outstanding and meritorious service', Major General Philip Hayes, Commanding General, announced today. The officer, who at the age of 13 prepared a map of Puerto Rico, where he was born, which was used for the landing of American troops and the occupation of the island during the Spanish-American war, was Service Command Quartermaster from 1941 to 1942, director of supply and services from 1942 to 1943, and director of supply from January to August, 1944. His commendation was presented for the work he did in these posts.

"The citation read: 'The Service Command functions of supplying and equipping the various housekeeping installations and the many units training in this Command for subsequent shipping to theaters of operation were expeditiously and efficiently carried out under his supervision during the strenuous period of rapid expansion of the Army and the accelerated activities connected with the activation of units, training and troop movements. His personal qualifications, quiet and effective attention to duty and manner of performance were of the highest order and the success of the all-important supply functions are a great credit to himself and the Command.'

"The Colonel was graduated from M.I.T. as a mechanical engineer and spent two years in the field before being commissioned a second lieutenant in the Coast Artillery Corps in December 1911." The Class sends its congratulations to Rudolf.

We are also glad to hear from Lewis H. Johnson, VI, who, among the rest of us, used to struggle with those volts, ohms, and dynamos in the old Lowell Building. He says: "Regarding the Clan, there are now five grandchildren. My son, Ralph, the class baby, has a son, Stephen Dudley, aged about two. My daughter, Mary, who lives near Annapolis, Md., has four children. Peter Dudley Albertsen is seven; his brother, George, is nearly six; another brother named for me, Lewis Howes, is four, and there is a little sister, Wilda Louise. She is two and has Titian hair and brown eyes like her great-grandmother, Nora Howes Johnson. My daughter, Elizabeth Ann, is married but has no children. Her husband is Major Thomas Scott Sexton, a doctor in the Medical Corps of the Army and a fellow at Mayo Clinic. He is in the European theater now. Elizabeth works for the Bell Telephone Labs as her contribution to the war effort. My wife and I sold our small farm in Madison and moved

two years ago to a small place nearer the railroad station in the same town. Our responsibilities (hers mostly) are considerably reduced, and I don't need gasoline to get to the station. I work 42 hours or more a week at the Bell Telephone Laboratories, attend the opera once in a while, and devote my spare time to the war effort through the United States Power Squadron and its allied interests. I am national chairman of the committee on advanced grades (which directs the teaching of all branches of navigation in the United States Power Squadron) and president of the N (Navigator) Club. I am also a member of the Coast Guard Auxiliary and for a year or more served as navigation officer of my flotilla." Then Lewis adds in his letter to Paul: "None of these things are of much interest or worth writing about. I write only to keep you happy." And Paul adds: "A mighty good report in spite of the facetious sentence or two at the end of the letter! The Power Squadron, as I understand it, is made up of organized powerboat owners."

Here is further commentary on Charlie Johnson, the "Pearl House," and the library in Putnam Valley, N.Y., to which Mrs. Desmond has sent so many of her books. (See the February Review.) In 1941 the Review Secretary, with his daughter Jane, made a land trip to Orr's and Bailey's islands, Maine, this time by car for we almost invariably cruise around Casco Bay by boat. Orr's Island is separated from the mainland by a narrow channel, but to get there one must first cross the bridge at Simon's Gurnet, and near low tide my 30-foot *Elektros* can just clear the bridge, but how the tide sluices through! Bailey's Island is out beyond Orr's Island and connected to it by another bridge. Just off the tip of Bailey's Island is Jaquish Island, and on the tip of Bailey's is Jaquish Inn. It is a wonderful location, right out at sea, and the shore dinners, particularly the lobsters, are excellent. After dinner we visited the Pearl House. The people said that their name was Johnson and that they had just purchased the house from the owners, descendants of Captain Pennell who occupied the house at the time of the story. They had intended to exclude all visitors until they had become "settled," but so many visitors, particularly those from afar, were so disappointed that permission was given to inspect the premises just as they were. We still have the colored movies of the house and grounds with Harpswell Sound in the background.

Charlie writes: "I was at my sister's house a few weeks ago, and she remembered you when you visited the Pearl House, which was the first year she was there. In my letter I mentioned the library in my town of Putnam Valley, N.Y., as Tom's wife has written a number of books, especially children's books, and they have sent me a copy of each one for the library. In 1931 Mrs. Johnson started a library in our home, and she had it there for six years, until it outgrew the space. We then formed a library association and got a charter from the State of New York. The library was housed in the new Central School. I assisted Mrs. Johnson in the library, and when she died in 1940, I was made the librarian. In 1939 the circulation was 5,100, and in 1941 it was 8,700. The population of our town is 1,200, but we have a large summer popu-

lation. In September, 1942, I went with the Army Engineers and resigned as librarian. I was made a trustee, and this summer I submitted my resignation, as I'm not there to do anything, but they refused to accept it. If the opportunity arises, I'd like very much to visit you at the Isle of Springs."

The Review Secretary as usual attended the winter technical meeting of the Electrical Engineers but this year did not see the several '09 men whom he usually meets. He did, however, meet Ed Howe, VI, who is still with the Federal Power Commission, on leave from the Consolidated Edison Company. Also on February 13, former students and friends of Dr. Dugald C. Jackson, former head of Course VI, sponsored a birthday party at the Engineers Club, Boston, in honor of his 80th birthday. Three of us from our Class were present. Tom Spooner, VI, came all the way from Pittsburgh. He was formerly assistant director of the research laboratory of the Westinghouse Company. For a number of years he specialized in magnetism and not only wrote several papers on his researches but has written a book, *Properties and Testing of Magnetic Materials*, which is one of the few authoritative modern books on the subject. Tom has recently been promoted to be manager of the engineering and standards laboratory. Francis Loud, VI, was also present. He is still an engineer with Jackson and Moreland, consulting engineers. Reg Jones, VI, was one of the sponsors, but he could not be present at the party. — PAUL M. WISWALL, *Secretary*, 90 Hillside Avenue, Glen Ridge, N.J. CHESTER L. DAWES, *Review Secretary*, Pierce Hall, Harvard University, Cambridge 38, Mass. *Assistant Secretaries*: MAURICE R. SCHARFF, 3860 Rodman Street, Northwest, Washington 16, D.C.; GEORGE E. WALLIS, 1606 Hinman Avenue, Evanston, Ill.

1910

Again I have the sorrowful duty of reporting the passing of one of our classmates, Sydney I. Snow, who died on January 16 in Rochester, N.Y. The following is from the Rochester *Times-Union*: "Mr. Snow had been in poor health for the last year but remained determined on the job until illness forced him to take a sick leave. . . . He had been employed by The Times-Union for seven years. . . . From childhood he had wanted to write and in 1909 he quit . . . Technology . . . where he studied chemical engineering, to become a cub reporter on the Christian Science Monitor in Boston. He stayed there four years. Seeking experience in new areas, he went to California to work five years for the San Diego, Calif., Union. His next assignment was five years with the Associated Press in Philadelphia and Brooklyn. From the wire service he went to the Reading, Pa., Tribune as managing editor, remaining there three years until the paper ceased publication. His next post was that of public relations counsel for the N. W. Ayer & Son Advertising Company in Philadelphia. The year 1929 found him teaching at the University of Washington. . . . Soft-spoken, gentlemanly, scholarly, Sydney Snow was a mine of information on many subjects, and his knowledge of the Navy was frequently sought by his newspaper friends. His father was Rear Admiral Albert Sydney Snow,

USN, commandant of the Boston Navy Yard. . . ."

George McRae has been appointed co-chairman of the 1945 Red Cross War Fund Drive for Newark, N.J. The following is from the Newark, N.J., *Star-Ledger*: "Mr. McRae is vice-president and general manager of the New Jersey Bell Telephone Co. He has been one of the leading citizens of this general community for many years, having given liberally and earnestly of his time and endeavors for the public welfare. McRae has spent his entire business career in the Bell System, which he entered in 1910 following his graduation from . . . Technology. After several years spent in developing and extending the toll and long distance service for the American Telephone & Telegraph Co., he became successively chief engineer of the Illinois Bell Telephone Co. and the New York Telephone Co. In June, 1925, McRae came to New Jersey as general manager of the properties of the New York company in this State, and continued in that capacity until October, 1927, when the New Jersey Bell Telephone Co. began Statewide operation to provide unified telephone operation for the entire State. He then became vice-president and general manager of the New Jersey company."

I received the following letter from Don Williamson. (I wish others would write in telling of their life in the past years.) "For some reason or other, I seldom see 1910 fellows out here in Chicago and have no direct news from them. Perhaps, however, I ought to tell you a little about myself. This is the 20th year that I have been conducting this business. We manufacture industrial adhesives which are used primarily in the packaging industry. These adhesives are quite largely employed in the war effort for such operations as waterproof packaging of mechanical parts for airplanes for export, waterproof sealing of shipping cases for munitions of war, sealing of packages of explosives, sealing of food packages for Lend-Lease, waterproof labeling of packages of munitions of war, and adhesives for surgical bandages — to mention a few. The raw materials entering into our products formerly came from various parts of the world, and many are entirely cut off, requiring a great amount of intensive work to find suitable substitutes and alternates."

"My three children are now married. I have two girls and one boy, who is in business with me. Ever since I have been in this business, I have been active in the Adhesive Manufacturers Association, trying to put into effect ideas and practices of advantage to the industry. This association has been very helpful in our dealing with the government agencies in procuring raw materials. The manufacture of adhesives is declared an essential industry by the War Manpower Commission. For several years now I have been chairman of the board of the Adhesive Manufacturers Association of America. It would be a pleasure indeed to hear from any 1910 fellow as he passes through Chicago." — HERBERT S. CLEVERDON, *Secretary*, 117 Grant Avenue, Newton Center 59, Mass.

1911

Just as I predicted in the last class notes, 1911 went beyond the \$5,000 mark in amount contributed to Alumni Fund IV,

our January 31 total of \$5,038.50 from 148 men placing us at the top of class contributions (1922 ranking second with \$4,114), and our 175 per cent of class quota is exceeded only by the 50-year Class, 1894, with 260 per cent and the Class of 1893 with 215 per cent. Reread that last phrase in the 1911 notes for March: "1911's quite a Class!"

I am sure that with me you will all delight in the recovery of Don Frazier, II, insurance leader of Richmond, Va., who has been quite ill. His good wife, Jess, writes: "I have intended for a long time to write you that Don was taken very sick, from overworking, and was at home for two months. The doctor says it's a miracle how he came back and is so well today. He was so completely exhausted he slept for days, but now is getting 10 hours of sleep a night. He had been working on the Sixth War Bond Drive, but has learned his lesson and is taking care of himself. For anyone who had never been sick he was a wonderful patient. One learns at a time like that how friends can help, and we believe their prayers pulled him through. We never realized we had so many friends."

"For two years I have worked with the First Fighter Command here, as a supervisor at the Filter Center, from 6:00 A.M. to 10:00 A.M., three times a week. Now I am assistant chairman in the women's division of the War Finance Committee, and we are installing the payroll deduction plan on Bonds in all firms with 25 to 100 employees. Most of the larger firms already have it, and it is handled by the men. This is most interesting work, and we are meeting with splendid response." Nice goin', Jess — we'll sure be looking for you and Don at our 35-year reunion.

O. W. Stewart, I, very thoughtfully sent me a copy of a published speech made by Bob Haslam, X, director, Standard Oil Company of New Jersey, before the Baltimore Advertising Club on the occasion of the dedication of a new 100-octane plant at the company's Baltimore refinery. Here are some of the highlights of Bob's fine talk, which bears the title "New Frontiers": "For the past 25 years I have spent about one-third of the time teaching chemical engineering, about one-third in the field of scientific research, and one-third in advertising and sales. Superficially, these appear to be quite dissimilar lines. But in many respects they are not. All three have the same general objective, and all three help bring about a common result — progress, toward a better life — for mankind. . . . And, as the teacher, the researcher, and the businessman advance, they everlastingly find themselves facing new frontiers. If they are true to their calling, they are always pioneering 'frontiersmen' — and mankind calls the fruits of their successful efforts — Progress. . . ."

"We are no longer men living in the two-dimensional world of the past. We can open the frontiers not only of the east and the west, the north and the south, but also of the depths of the earth and the skies above. In the oil industry, we're constantly exploring a subterranean frontier extending far beneath the earth. . . . However, in these days of aerial warfare, we are more aware of the skyward frontier than we are of the one beneath the earth. . . ."

"When, however, we come to the unexplored realm of science, we face frontiers

extending much farther than our geographical frontiers, or those either above or below us. Here the only limit is the knowledge and the power of God. This is an inexhaustible frontier, not to be finally penetrated until after the passage of Time. . . . In chemistry, physics, and engineering the men who've developed these things have penetrated new frontiers of science and have brought home to us a radically new environment — one in which we shall be surrounded with a host of new materials made from the dreams of men. . . .

"Of the many frontiers challenging the attention of today's pioneers, let me mention but one: the frontier of better relations between man and his fellow man — the frontier of human relations. . . . A frontier is usually a place of activity. This is certainly true in the frontier of human relations. . . . So we see that there are and always will be limitless frontiers of space, of science, and of human relations. Frontiers, the penetration of which will always be a challenge to restless mankind; frontiers, which when penetrated, will each in turn open up new vistas, as the mounting of a range of hills gives us a new view farther on and loftier."

Here is his masterly summing-up: "Our war record shows that Democracy is far from decadent. The speed with which our shops, factories, and laboratories were converted from the tasks of peace to those of war, the magnitude and the quality of their output — these are the answers to any doubting Thomases about the efficiency of our business and industry either as a provider of the comforts of peace or of the munitions of war."

"To my mind there is a fundamental reason why these things will always be true. America is a nation of frontiersmen, and the pioneering spirit of the frontier did not die with the advancing civilization. Our political theory is based on the concept of the education of the individual and keeping him free from that kind of regimentation which saps the driving energy of men. Whether he wears a coonskin cap, grimy overalls, or the suit of a businessman, the American is always a frontiersman — pushing forward toward the horizons of tomorrow."

A few days later O.W. sent me this tribute to Monk de Florez, II, in *Science News Letter* for February 3: "The Navy teaches a bomber crew to fly on the ground in a training device that resembles a big, twin-motored Mariner flying boat. It has all the flight controls and instruments that are in the real planes, as well as electrical computing mechanisms which enable the instructor to check on what the pilot, navigator, and other crew members are doing. . . . The elaborate trainer was developed by Bell Telephone Laboratories in cooperation with Capt. Luis de Florez, head of the Bureau of Aeronautics Special Devices Division, as a step in taking many unnecessary risks out of naval training flights. Trainers for other types of planes are now under development."

Quite a number of you have said you hardly realized our Class had 21 men active in World War II, as reported in the February list of M.I.T. men in service. Here's the record: 18 Army officers — Lieutenant General George C. Kenney; Major General Sidney P. Spalding; Brigadier General Law-

rence B. Weeks; Colonels Henry C. Davis, D. P. Gaillard, Carl G. Richmond, Laurence Watts; Lieutenant Colonels Lewis L. Baxter, C. Phillips Kerr, Richard H. Ranger, O. Robert Schurig, Henry W. van Hovenberg; Majors Edward R. Hall, Harold S. Lord, Harold L. Robinson, Edward D. Van Tassel, Jr., Alexander W. Yereance; Captain Willson Y. Stamper, Jr.; two Navy officers — Captains Luis de Florez and Ralph T. Hanson; one Coast Guard officer — Lieutenant Commander Roy G. MacPherson.

Ted Van Tassel, X, writes that he is enjoying his work as chief of reconditioning service at the regional hospital at Camp Polk, Louisiana, very much, adding that "the program here is coming along very nicely, and we enjoy being in Louisiana this winter, particularly when we see pictures indicating that you folks up north are experiencing a real dose of winter. I have not seen snow and ice for two winters now."

Jim Greenan, III, accompanied his fund subscription with a note: "I still have my headquarters in Reno, Nev., and have been shipping copper ore from Central Nevada for the last two years and, as usual, am constantly searching for new properties."

— Charlie Hobson, X, superintendent of the Barium Reduction Corporation at South Charleston, W.Va., apologized for his procrastination, reported a new home address — 2608 Seminole Avenue, Charleston — and added: "I was over East just before Christmas and had a chance to see my boy, Tim, who is now back in this country and stationed at the Newcastle Air Base, outside of Wilmington, Del. I also had a glimpse of my first grandson — we're certainly getting along in age! I miss the 1911 dinners — sure would like to see 'you-all,' as they say here."

A political writer in the *Worcester Telegram*, on the first Sunday in February, commenting on the message of our new Massachusetts chief executive, Governor Tobin, who was planning a larger budget by far than Governor Saltonstall had ever had, said, "The Governor might find interest in a story which we heard told last week by President Carl S. Ell of Northeastern University."

Carl's story is of the motorist, piloting a creaking car of ancient origin, who drove up to a filling station and asked for some gasoline. "My tank's about half full," he said, "but this car certainly does use a heap of gas. I shan't get far with the half tankful of gas I have, so you'd better fill it up." He left the motor running, and the attendant went around behind the car and started to pump the gas. He suddenly stopped, stepped to the door by the driver, and said: "Say, Mister, you'd better shut off that engine — you're gaining on me."

Believe it or not, O.W. has just sent me a clip from the *Boston Globe* showing the smiling face of "Lt. (j.g.) Dorothy Ell, daughter of Pres. Carl S. Ell of Northeastern University and Mrs. Ell." The sub-heading announces she has been transferred from Sampson to the Hub, where she will have charge of the Office of Naval Reservations at 150 Causeway Street. She enlisted in the Navy on October 6, 1942.

A characteristically newsy note from Carl Richmond, I, states: "Industrial Fire Protection is still my army job and has

been for 50 months." He is in Washington, you know. Said he: "I whistled across the street today to Major Ned Hall, II, and was surprised to learn he is leaving in late February 'to develop industrial production in France to assist the Army Service Forces.'" Further he said: "Joseph Webb, formerly Julius Waldstein, I, is in a Chicago hospital having the balls of both eyes removed and replaced with artificial lenses, with which he expects to be able to see." I'm sure we all fervently hope he can see!

Carl also enclosed a notice of the death of George Robinson, IV, who was with us throughout our four years, but finished with 1912 and affiliated with that Class. He died at his Belmont home on January 16, as a well-known architect who had designed many notable fire stations.

It was nice to learn of Thorne Wheeler, X, being re-elected a vice-president of Arthur D. Little, Inc., in Cambridge at the 1945 annual corporation meeting and to see our Alumni Association president, Ray Stevens, '17, added to the board of directors at the same meeting. — I was sorry to miss a call here in Gardner from Warren Simonds, I. He's with the Rodney Hunt Machine Company in Orange, Mass., you know. — Undoubtedly you saw the picture of the three Compton brothers — Karl, Wilson, and Arthur — and the accompanying story, "Th: First Family," in the "Education" section of *Time*, for February 12. If you missed it, look it up; it's well worth five minutes of your time. Between them they have accumulated 44 degrees, their illustrious father and mother having been awarded four and two, respectively. Truly, a "first family" in education.

From the Alumni Office we learn that the architectural firm of Kruckemeyer and Strong (Ed Kruckemeyer, IV, and Charlie Strong, IV) is now at 1304 Carew Tower, Cincinnati 2, Ohio. — These notes will appear just too late for an Easter greeting to you all, but Spring will have "sprung," and you know what that means: Alumni Fund V is with us. Act early! — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Gardner, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford 55, Mass.

1912

It is with great regret that we note the death of George E. Robinson, IV, on January 16. The following notice is taken from the *Boston Herald*: "George E. Robinson, 56, of 9 Horace Road, Belmont, noted architect and lecturer, died . . . at the Cambridge Hospital. A native of Boston and a member of the Class of 1912 at . . . Technology, Mr. Robinson designed the Mission Hill housing project, all the fire stations in Arlington, the Bowdoin Square fire station in Boston, and several Quincy fire stations. He was a member of the Massachusetts State Association of Architects and the New England and International Associations of Fire Chiefs. He leaves his wife, Gertrude B. Robinson, and two sons, Cpl. Ernest M., serving in France with the Army, and the Rev. Norman A. Robinson, pastor of the Shawnee Presbyterian Church, Shawnee-on-the-Delaware, Pa."

Charles A. Cary, I, assistant manager of the nylon division of the Du Pont Company since January 1, 1940, has been named

division manager. After several years with the Du Pont Company in explosives production, he was transferred to Old Hickory, Tenn., with what was then the Du Pont Rayon Company. In 1936, when the rayon department of the Du Pont Company was formed, he became manager of control planning and remained there until he was made assistant manager of the nylon division. — We are pleased to announce the marriage of Page E. Golsan, VI, to Helen Payntar on the 7th of February. They will be at home — 40 Fifth Avenue, New York City — after the first of March. — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown 72, Mass.

1914

Ross Dickson says "Thanks, Fourteen-ers." We made our quota in numbers (140) and crossed the 90 per cent mark in dollars, being about \$300 below the goal in the fifth Alumni Fund year which ended April 1. Let us keep up the good work.

Hats off to Art Peaslee! Art has received from the commandant and from the engineer-in-chief of the United States Coast Guard a citation for outstanding work accomplished for the Coast Guard in eastern Connecticut. The major achievement of this construction program was a 10-building unit to house the Reserve Officers Training School at the Coast Guard Academy at New London. The presentation of the award was made by Rear Admiral Pine, superintendent of the Academy, and took place at the Academy.

Wherever Admiral Tom Richey and Mrs. Richey are moved to, Mrs. Richey establishes the battle flag repair headquarters. Now that Tom is in Washington, Mrs. Richey is conducting her repair work there. In a recent issue of the *New York Times* Mrs. Richey was pictured repairing a shell-torn flag, and the accompanying article told of her work on the flag rescued from the old *Hornet*, which was lost in the Pacific, and how, after being repaired by Mrs. Richey, that emblem went to sea with the new *Hornet*.

Phil Covitt's son has been promoted to a first lieutenant and is serving in the New England area in connection with procurement, his special activity being quality control. Phil also has a daughter, Frances, who will soon be graduated with honors from the University of Michigan, where she has specialized in psychology. — H. B. RICHMOND, *Secretary*, General Radio Company, 275 Massachusetts Avenue, Cambridge 39, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York 19, N.Y.

1915

We have a big column of fine notes for you this month. First, our final score in the Alumni Fund — 157 of you (90 per cent) gave \$3,257.50 (110 per cent), an average of \$20.75 per man. Let's do it again this year. But the following figures will show you our problem. With checks of \$50 or more 14 men gave \$1,420 or 44 per cent, leaving an average of only \$16.35 a man for the 143 other contributors. So I'd like all you men who gave the smaller amounts, as acceptable as they are, to raise your ante in this year's Fund that opens on April 1. Our first check comes from St. Elmo Piza in London. Let your lights so shine. . . .

Ben Neal of Lockport, N.Y., himself a generous giver among those 14 listed above, describes my problem with this fine spirit: "I am very much interested in seeing the Fund go over, and particularly in seeing our Class do its share. I feel very strongly however, that every effort should be made to avoid allowing a few to carry the load, and this statement is based on a fairly substantial amount of experience in fund raising. . . . The effort should be made constantly to broaden the base, otherwise you get relatively few fellows carrying the load, and if anything happens to one of them your whole program is upset. I am very anxious to see the goal attained; when you get a chance, sometime before March, or as the end of the drive rolls around, drop me a line as to how it looks, and if you need some more help I will be glad to come in."

Since our last notes the well-known Office of Defense Transportation order restricting conventions has come out. With the hope that this ruling may be changed or modified before June, we are proceeding with our reunion plans. If, however, the rule still stands, we must comply with it and shall call off all plans at the last moment. At least, let's go ahead so we'll be prepared.

With Ralph Hart's liberal help we held a class dinner in New York City on February 2 at the Panda Club. These 33 men established a new high attendance record for a New York dinner: Tom Huff, Fred Cook, Chauncey Durkee, W. A. Swain, Jerry Coldwell, George Rooney, Alan Dana, Lew Bengtson, Frank Murphy, Edward Sullivan, Kebe Toabe, Wally Pike, Abe Hamburg, Sol Schneider, Chris Wolfe, Ben Lassen, Gene Place, Herb Anderson, Frank Herlihy, Harold Warfield, Hank Marion, Charlie Williams, Charles Blodgett, Louie Zepfler, Henry Sheils, R. H. Walcott, Wayne Bradley, Doug Baker, Charles Malone, John Little, Alton Cook, Ralph Hart, and Azel Mack. Tom Huff, whose new address is 7055 West Garrett Road, Upper Darby, Pa., and Lew Bengtson of 25 Fifth Avenue, New York City, made their first appearance since graduation. Doug Baker, Wayne Bradley, and Charlie Malone were welcome returnees after a long absence. Herb Anderson and Sol Schneider loyally came up from Philadelphia, and eight men went down from Boston. After a delightful dinner, despite wartime scarcities, most of us went on to Ralph Hart's apartment, where the party carried on gaily for a long time. With his new press camera Ralph took many pictures which will be distributed to the men present. All in all it was a very lively and enjoyable evening.

Although we're all sorry to know of Herb Swift's illness, we can get a laugh from his rich sense of humor that should soon have him out of that hospital with our sincere wishes for a speedy and complete recovery: "During the last month or so of last year I suffered heart pains but did not recognize them as such. On January 22, I called in an M.D. He slapped me into the hospital P.D.Q. and gave me a six weeks' sentence. I still have two more weeks to serve. So — I shall not be able to make that trip to New York. . . . Since the first two days, I have been quite O.K., but I have been unsuccessful in persuading the judge

that I was. In four weeks I have been out of my bed but darn little and never outside my room. At present I notice that they are starving me, for I am always hungry and have lost 20 pounds. The doctor says that is nothing: I must lose 50 before I leave. He never had a belly like mine and doesn't realize how their importance grows with size. There is one advantage in not being very sick in a hospital — nurses. Well, regards to the boys and also regrets to that movie magnate, Ralph Hart, who is on our reunion picture brigade; I know he will make the evening at his place seem short."

Other after effects of that famous night are these notes. From Jerry Coldwell in Des Moines, Iowa: "What a change in location a week can make! I came out here quite unexpectedly to look at a hot spot but expect to get out tomorrow. Thence to Knoxville and then to points West. It is now around midnight, and I can assure you that it is not at all so interesting as it was at midnight just a week ago. When Ralph has the films developed, will you ask him to send me prints, if any, in which I would be interested. It was a nice party, but I should like to have seen Weare Howlett, Frank Scully, and Henry Daley." — From Frank Murphy: "I consider it a well-spent week end at our class party in New York; I certainly 'unlaxed' as I never did before. On these snowstormy nights I'm all alone in a nice warm office in Boston wishing I were back in Ralph Hart's place."

And, then, on February 16 at Walker Memorial, M.I.T., shattering all previous attendance records and establishing a new all-time high for class dinners, 35 men were guests of Al Sampson. Al threw the party; another gracious host added to the others. Our thanks and appreciation to Al for his hospitality. Present were: Frank Scully, Louie Young, Frank Herlihy, Sam Eisenberg, Jac Sindler, Easty Weaver, Henry Sheils, Carl Wood, A. H. Anderson, John O'Brien, Abe Hamburg, Paul Weymouth, W. L. Campbell, George Rooney, John Dalton, Leslie Heath, Larry Landers, Arch Morrison, Al Sampson, F. E. Waters, Weare Howlett, Pete Munn, Herb Whitcomb, Whit Brown, Wallie Pike, Horatio Lamson, C. T. Hansen, G. J. Moulton, Edward Sullivan, Frank Murphy, Loring Hayward, Roland Baldrey, Seward Highley, Chet Runels, and Azel Mack. New men we had not seen before were Bill Campbell and Paul Weymouth. Appearing again after a long absence: Johnnie O'Brien, Easty Weaver, Clarence Hansen. Many men came long distances to both New York and Boston dinners — surely an example of staunch interest and loyalty. After one of Bert Bridges' excellent dinners Frank Herlihy, master of one of the Boston high schools, gave an informal talk on his experiences with teachers, pupils, and systems and touched on the current problem of juvenile delinquency — an interesting talk enjoyed by us all. Many of the boys stayed late, and it was refreshing to see the little groups sitting around discussing favorite subjects.

The New Year greeting received from the Hayward family was in the form of a "Progress Report for 1944," a letter-size blueprint, detailing individual doings. Loring's attendance kept intact his record of having been at every class reunion and dinner. — Bill Campbell has returned to

become professor of food technology at the Institute. Last month's Review carried the full story. Bill looks fine and was warmly welcomed back, as we are all glad he is in Boston so we can see him again. At our dinner he was in rare form entertaining his many listeners, Course I and otherwise, with his inimitable stories, unfortunately not reprintable. — Frank Buckley of Boston was kept from the dinner by being in Florida, recovering from recent illness. — Only a few of us are left! A new class benedict on April 20, 1944, Charlie Blodgett married Mrs. Cynthia Pooler of Albany, N.Y. They live at 319 Marine Avenue, Fort Hamilton, Long Island, N.Y. All the best to these newlyweds.

In answer to my Christmas letter, Gardiner Wilson writes from Armstrong Cork Company, Lancaster, Pa.: "It was thoughtful of you to send holiday wishes, and I hope you were in for some good cheer yourself. . . . I always read with interest the news of our classmates in your notes and realize I should go on record now and then. This is my ninth year with Armstrong Cork Company, project engineering plastics, mainly closures, development work (always unfinished business with new plastics), electronic heating, automatic machinery, tool design, equipment installation, etc. It's a fascinating field, and the war record of plastics will surely make it one of the fastest growing after the war. Two nights a week at the college here I teach a class in design and molding technique. I believe I wrote previously that I was in the Coast Guard Reserve (temporary). Since I have lately been made a commissioned officer (warrant boatswain), my patrol duties have slacked off for more executive duties as vice commander of our Lancaster flotilla. To keep out of mischief, I manage to do some studying for a navigator's rating so if the jack pot turns up some day, I can properly handle that cruiser. . . . My daughter married a lieutenant in the Air Forces, and my son, aged 14, wants to be an aviator some day. A brief observation, since you ask, is that one can get a lot of fun out of living by always having plenty of unfinished business on hand, although it would be even better if the old gang could get together more. Even our Technology Club of Central Pennsylvania, of which I am Secretary, has suspended meetings for the duration. Here's hoping that the duration will be shortened."

Herb Whitcomb, formerly a dairy farmer, for some time has been in a new business, Simplified Management Systems, 141 Milk Street, Boston 9. Herb loyally attends all class parties. — Allen Abrams, Vice-president of the Marathon Paper Mills Company, Rothschild, Wis., was in prominent attendance at the Third National Chemical Exposition of the American Chemical Society, Chicago Coliseum, from November 15 to 19.

In more ways than one does Sam Eisenberg "help Azel," or rather 1915, and this is typical of his friendly spirit: "I read with great interest your report for the Class of 1915 in The Review, and I was particularly aware of your last sentence of that report. You are hollering for help in connection with what you are going to write next month. . . . Well, that is pretty good, to find 'old Azel' running out of ideas

and running out of words. You must be getting old to admit any such contingency, particularly at this time, when our 30th reunion is almost immediately upon us. Certainly there should be plenty to write about concerning all our classmates at the end of 30 years. A great many things have happened to them and to the world in general, in the 30 years since they have been out. . . . Looking at the larger picture, ours was probably the most hard-luck outfit that ever came out of M.I.T., and through no fault of anyone, or, for that matter, through no fault of the group. History was responsible, and the conditions which made history. . . . We were no sooner out on our own, than World War I broke. Then came the hectic Twenties, and some of us thought we were on the road to Utopia and everything was just fine and dandy. Then came the great depression of 1929-38, and you know what happened to almost everybody during that period of time. And now, with some of us developing bald pates and most of us becoming gray-heads, we are in the midst of another World War and our boys are out repeating what we did in 1917 and 1918. . . . It is a hard world, I will admit, and it has been a hectic three decades; but what gives me a great kick is that, in the face of all this that has gone on during the last 30 years and all the things that have happened to our classmates during that period, 'old Azel' has nothing to write about and is hollering for help. . . . Sing out and tell us what you want, and we will begin shooting ideas at you."

It is sad to tell of the passing of two of our classmates. Frank R. Foster died suddenly in Boston on January 22. Frank was single, lived alone in Brookline, Mass., and had been a sales engineer for an engineering equipment company in Boston. Alton A. Cook writes about Marvin J. Dodd: "I happened to see in the Newark evening *News* of December 28 a news item concerning the passing [on December 27] of one of our classmates, Marvin J. Dodd. I am enclosing it for your information in case you have not heard about it through other sources. I did not know Marvin Dodd personally, but he was often confused with Sidney Dodd, originally a 1915 man, since both hailed from East Orange, N.J. I often see Sidney who now lives in Caldwell, N.J." Marvin was vice-president of Hooton Chocolate Company, Newark, with which he had been associated for 25 years. Alton Cook also says: "It was pleasant to run into you and Ralph Hart in Atlantic City last October and I hope to see you again soon. If you are ever in Newark, give me a call at Market 3-0516 (the Arkansas Company). I had a telephone call recently from Larry Landers, and he threatened to look me up on one of his next visits to the metropolitan area." To the families of Frank Foster and Marvin Dodd go our sympathy and sincere feelings in their grief, and I have so written them both.

Some time ago I reported with great joy that Pellian T. Mar was back in the United States, but I couldn't get a story from him. Thanks to Frank T. Yeh '14, XIII, a captain in the Chinese Navy and assistant chief of the Chinese Naval Construction Mission, Washington, D.C., we have this fascinating history of Pellian's outstanding achievements for his country: "When Pel-

lian T. Mar received your last letter, he was rather shy and reluctant to comply with your request for an account of his work, because he thought there was not much about himself worth mentioning; so I venture to do it for him. . . . As Admiral Mar and I have been intimate friends and associates since boyhood days, I have a close knowledge of his life and work. I hope the following brief account will be of interest to his classmates, who will thereby see that he is upholding the tradition of our dear alma mater to serve mankind in the interests of science and is still helping to boost the ever increasing prestige of the Class of 1915. . . . With my highest regards I submit an outline of his biography: Pellian T. Mar was born in the picturesque province of Fukien. He received his early education in the province of his birth and in the Chinese Naval Academy at Nanking, from which he was graduated in 1909. Because of his scholastic excellence, he was chosen by the Chinese Navy Department to pursue higher study in the United States, after having served for one year on board the cruiser *Haichi* as midshipman. He was graduated from Technology in 1915 in what was then known as Course XIII-B and received his M.S. degree in 1916. After graduation, he spent a year with the New York Shipbuilding Corporation at Camden, N.J., and returned to China in 1917. . . . He was then commissioned as an assistant naval constructor at the Foochow Dockyard. In 1922 he was made superintendent of the establishment and subsequently its director in 1926 with the rank of captain. In the meantime, he was interested in an irrigation project which he promoted and carried through with great success, bringing blessings upon the farmers who, in former years, had depended entirely upon natural rains for their harvest. . . . His ability to organize and his energy to carry things through had, by this time, won for himself a higher recognition. He was therefore chosen to take charge of the Kiangnan Dock and Engineering Works at Shanghai in 1927 with the title of director. He remained in that post until 1930. His activity in other fields forced him to resign in that year, but he was called back again in 1933 and promoted to the rank of rear admiral. . . . War with Japan required his departure from Shanghai to Chungking. He was appointed in 1944 by the Chinese Military Council to head the Chinese Naval Construction Mission to the United States. He is now located in Washington, D.C." Send in your Alumni Fund check at once and let's hit 100 per cent. — AZEL W. MACK, Secretary, 40 St. Paul Street, Brookline 46, Mass.

1916

The Class had a most unusual reunion — unusual both because of the occasion and the number and geographical origin of those who attended. The occasion was the departure from New York of Bob Wilson to assume his duties as chairman of the board and chief executive officer of the Standard Oil Company of Indiana. Bill Farthing had sent out notices and made arrangements for a dinner in a private suite at the Essex House on Central Park South. Everybody in Essex House seemed to know him, from the headwaiters to the good-looking girl who, between entertainments in the main

dining room, came up to play boogie-woogie for us. Bill probably owns the place, although he wouldn't admit it. The suite, with a private bar set up in a drawing room and a well-laid table in another, gave the impression of a residence (New York style) and added to the feeling that this was our evening without interference from the outside.

As we sat over coffee and cigars, Bill suggested to a number of those present that they might want to make a few remarks about Bob. He had no trouble in finding plenty of response from those who wanted Bob to hear what he meant to the Class and the character and quality of the reputation that he was leaving behind him in this city which had been his home for 10 years. In responding, Bob, who was clearly moved, said what all of this meant to him and told of some of the problems and duties that would await him in Chicago. He then turned the conversation to the Institute and gave a clearer picture than this reporter at least had had about the quality of its contributions, in research, toward winning the war. Not long after dinner (and as usual) the commuters went home, but those who had come from distances, such as Jap Carr from Wilkes-Barre, stayed until late, talked, and played bridge or gin rummy with the city slickers.

Those who attended were the following: Edward H. Barry, Richard G. Berger, Leonard E. Best, Walter D. Binger, Thomas D'Arcy Brophy, Robert S. Burnap, Arthur P. Caldwell, Jr., J. B. Carr, Laurence H. deLabarre, Harold F. Dodge, James M. Evans, Joseph Farhi, W. J. Farthing, Gilbert H. Gaus, R. E. Gruber, Thomas S. Holden, J. V. Meigs, Herbert Mendelson, J. R. Minevitch, and Leonard Stone. — Thanks for this report go to Walt Binger. — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Berke-Moore Company, Inc., 11 Boylston Street, Brookline 46, Mass.

1917

Bob Marlow writing recently to Ray Stevens says, in part: "I am sorry that I am unable to supply you with any interesting notes, as my long hours in the shipyard (safety engineering department of the Bethlehem Steel, Hoboken Ship Yards) prevent me from seeing any of the '17 gang. Mrs. Marlow and I did see Dix Proctor and Mrs. Proctor at a performance of 'Home is the Hero,' a play written by Mrs. Marlow's brother, Courtney Savage. Some time ago I had a short letter from Commodore Bill Sullivan in parts unknown, reporting that he keeps busy with the salvage fleet."

Penn Brooks is headed for China on a special mission that may take him several months. Details have not yet been divulged, but we understand that the mission will call for all of Penn's experience and ability in organization.

Neal Tourtellotte, writing on the letterhead of Janalu Farm to the Dean of Students, indicates that he has added the raising of champion Hampshire hogs to the growing list of his avocations. Neal is also chairman of the general advisory committee to the division for the blind of the Washington State Department of Social Security; and his activities and interest in this field are apparent from a perusal of a recently

published biennial report of the department. — RAYMOND STEVENS, *Secretary*, 30 Memorial Drive, Cambridge 42, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

1918

News is slow in coming in, and as much as I should like to have something in each issue, it is impossible. — Through the Alumni Office I find that Marion (Coe) Kenney, is now Lieutenant Kenney of the WAVES. As she is stationed in Boston, some of you around there may run into her on the street some day. I may have more news of her for the next issue. — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

The February Bell Telephone Laboratories' advertisement in "Technical and Scientific Publications," entitled "A Mica Mine in a Laboratory," outlines how a four-man technical mission flew to London to help ration the world's mica supply as the shortage was serious. Fred Given was chairman of this commission, and through its work the difficult situation was relieved and the supply increased by 60 per cent. During the past month George Michelson dropped in and reported that the construction business in general has become very quiet. George is chairman and assistant treasurer of a child welfare association in Boston. His associate, Izzy Slotnik, is president of a home for the aged. — George McCreery is in charge of the construction division of the Red Cross drive in Boston. — L. B. Smith also called. He had been attending a meeting of the Franklin Institute in New York on January 26.

Al Richards was in town on February 21. He had had lunch with Ben Sherman at the Union League Club in Chicago and talked to Dutch Seifert. Al "horned in," by invitation, on the 25-year book committee meeting held at Karl Rodger's home at 286 West 11th Street, New York City, and stayed through the cocktail period. The committee attending this meeting consisted of Fred Given, Don Way, Karl Rodgers, Izzy Paterson, Otto Muller, Leo Kelley, and Gene Smoley. The October 10th issue of the American Chemical Society's *Chemical and Engineering News* carried a photograph of Al Richards of the Dewey and Almy Chemical Company, at the time of the American Chemical Society meetings in New York. — W. Roy Mackay, assistant superintendent of the Bethlehem Steel Company's rod and wire Mills at Sparrows Point, Md., writes, "I should be very pleased to see any 1919 men who are in this vicinity at any time."

We have received the following changes of address: Bernard S. Coleman has moved from Newark, N.J., to 1028 Patterson Building, Denver, Colo. Eli Ettlinger has moved from St. Louis, Mo., to 170-70 Cedarcroft Road, Jamaica, Long Island, N.Y. Commander Roger T. Hall's address is O. in C., 78th NCB, Fleet P.O., San Francisco, Calif. Ernest L. Schwartz has moved from Maplewood, N.J., to 85 Pleasant Street, Franklin, N.H.

Earl P. Stevenson, President of Arthur D. Little, Inc., Cambridge, made the statement at the annual meeting on January 24 that keeping technical man power available

in the laboratories is vital at this stage of the war. Mr. Stevenson cited a recent emergency in which a front-line observer was flown back to the United States with information on a new enemy defense tactic. Because technical man power could be immediately concentrated on the problem, a promising countermeasure device was quickly developed. Mr. Stevenson pointed out that such problems will continue to arise and demand the kind of attention that only existing, competently staffed organizations can render.

Henry E. Wilson, a captain in the Army, received the Bronze Star decoration. — The analysis of M.I.T.'s men at war shows 22 of our Class in the Army and 12 in the Navy. Louis J. Grayson has just been promoted from major to lieutenant colonel in the Army. — Harry H. Mardoian was present at the New Haven Technology Club meeting held recently. — A. H. Blake, L. J. Grayson, and L. B. Smith attended the current Washington meeting.

The 25-year book should be in your hands by now and your contribution for the financing of this book, we hope, is in the Secretary's hands. — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York, N.Y. ALAN G. RICHARDS, *Assistant Secretary*, Dewey and Almy Chemical Company, 62 Whittemore Avenue, Cambridge 40, Mass.

1921

With the close of the current Alumni Fund and the start of a new Fund come our thanks to you for the steady increases both in the amount given and in the number of donors. Let's keep building them up further so that there will be no possibility of letting the Institute down in the days to come. Why wait for a notice? Send in your \$15 now.

Francis R. Whelton is the subject of a long account in the Boston *Globe* which reveals the inside story of his participation in the last world war. Now on the staff of the mayor's office in Boston, Frank has a story with a Ripley twist to it in that he will soon celebrate the 27th anniversary of his own untimely death on August 26, 1918. A few months after he was officially killed in action in Fismes on the Vesle River, Frank's father, former Mayor Daniel A. Whelton, was given his posthumous award of the Croix de Guerre. Actually, Frank was blown up by a shell and remained at a base hospital for six months, unable to speak, hear, or write, and not otherwise identified. He was later redecorated by Marshal Foch when the latter visited Boston in 1921.

Born in Boston, Frank left us in our freshman year to enlist in the regular infantry. He was sent to an officers' training camp but chose to go overseas with the 77th Division as a sergeant rather than finish the course. In time he received his commission as a second lieutenant. He served at Ypres and in Alsace Lorraine and had quite a record and a collection of medals when he was transferred to the 28th Division on the Marne. He had distinguished himself in tight situations on a number of occasions before the day when he led a patrol of 16 men and never knew what happened. Fifteen men were killed, and the detail was reported annihilated. Somehow Frank miraculously survived.

Now married and living at 96 Milton Avenue, Dorchester, he is the father of two girls and three boys. One of the boys is in the 77th Division in which Frank started his own strange career.

William B. Plummer, X, has resigned from his special assignment to the office of the Secretary of War and has dropped his lieutenant colonelcy to resume the duties of vice-president in charge of research and development for the Standard Oil Company of Indiana. Bill is back in his office at 910 South Michigan Avenue, Chicago.

Address changes are noted for the following: Raymond M. Badger, 14 Catharine Street, Worcester 5, Mass.; Max R. Butter, III, 221 Chestnut Hill Avenue, Brighton 35, Mass.; Thomas B. Davis, XV, Davis Company, P.O. Box 3005, Memphis, Tenn. — Say, when are you going to send that note to Cac? — **RAYMOND A. ST. LAURENT**, Secretary, Rogers Paper Manufacturing Company, Manchester, Conn. **CAROLE A. CLARKE**, Assistant Secretary, Federal Telephone and Radio Corporation, 591 Broad Street, Newark 1, N.J.

1922

George O. Clifford has been made manager of the technical division of Remington Arms, according to an announcement by C. K. Davis, President and general manager. Clifford has been a member of the executive staff of Remington Arms for the past five years. He joined the organization as works manager of the Ilion, N.Y., gun plant, later being made assistant manager of the commercial production section and later assistant manager of the technical division.

At the annual meeting of Arthur D. Little, Inc., Frank N. Houghton was re-elected secretary. — Frederick S. Blackall, Jr., President of Taft-Peirce Manufacturing Company in Woonsocket, has been elected president of the New England Council for the current year. — Harold Berry, Vice-president of Florence Stove Company in Gardner, Mass., is the retiring president of the Gardner Chamber of Commerce and continues his activities there as chairman of the budget committee.

We have an outstanding photographer in our class roster. A film entitled "Follow the Girls" by Oscar H. Horovitz was honored in the editorial contest of 1944 by the Amateur Cinema League, Inc. — By the time you read these notes, you will probably have received your copy of the Business Classification Index of the Class. It has been completed and now awaits only the mailing. — **CLAYTON D. GROVER**, Secretary, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. **WHITWORTH FERGUSON**, Assistant Secretary, Ferguson Electric Construction Company, 204 Oak Street, Buffalo, N.Y.

1923

Howard Russell has agreed to act as Assistant Secretary for the New York district, a welcome response to my recent plea for someone to take over where Jack Keck left off.

The New York *World-Telegram* in December had the following to say about one member of the Class: "Brig. Gen. Russell E. Randall is having blouse trouble. The one he wears now just isn't big enough to accommodate the 'tinware' he is authorized

to wear. Latest addition to the 'metal works' are the Distinguished Flying Cross and a second Oak Leaf Cluster to the Air Medal, pinned to his chest by Maj. Gen. Claire Chennault, in ceremonies at the 14th Air Force Headquarters in China. According to the citation, the missions 'involved not only attacks upon enemy installations, but also photo reconnaissance, selection of targets, and observing effects of bombing during missions.' His beribboned tunic also sports the Air Medal, the Legion of Merit, the Oak Leaf Cluster to the Legion of Merit, the Bolivian Order of the Condor, and the American and Asiatic theater campaign ribbons. The general has had the training for the job, his men point out. After a spell at . . . Technology he entered West Point, and four years later began pilot training. At the outbreak of the war he was ordered to the Panama Canal Zone, and later to India and China."

Edward McSweeney reports that after a two-year interval in Washington during the early part of the war, he came back to his management consultant business about a year ago. He is head of the Edward McSweeney Associates, at 521 Fifth Avenue, New York, N.Y. — Alexander J. Tigges has been appointed district technical advisor of the Air Preheater Corporation, with offices in New York. Tigges was with Jackson and Moreland, the Boston firm of consulting engineers, for 20 years, and most recently served as manager of consulting engineering for the Baldwin Locomotive Works at Chester, Pa. — **HORATIO L. BOND**, Secretary, 457 Washington Street, Braintree 84, Mass. **HOWARD F. RUSSELL**, Assistant Secretary, Improved Risk Mutuals, 60 John Street, New York, N.Y.

1925

These notes have been held as late as possible in the hope that I might have something definite to report on the progress of our 20th reunion plans, but no word has been received as yet. The chances are that you will receive word by direct mail before the May issue of *The Review* reaches you. In the absence of definite information concerning our own reunion, I may point out that Alumni Day is to be on Saturday, June 23, and it seems likely that our committee will select a date around that time to enable reunionists to take advantage of both with one trip.

In the midst of a "conspiracy of silence" on the part of the Class, I have received a letter from our former Secretary and President, Frank Preston. He says: "I'd certainly enjoy getting to a reunion this summer, but with the present transportation trouble it doesn't seem as if we could arrange anything on a big scale. Perhaps we could limit it to people who don't have to travel far. I think we might ask the advice of the Alumni Association, and see if they have any general plans. I've had to do quite a bit of work on the activities of the American Society of Mechanical Engineers in this region, and we have had to keep our meetings restricted to local affairs. For this reason I've waited a considerable while before answering your letter, hoping that transportation might improve. The news of Roger Parkinson's death reached me by roundabout ways only a short time before your letter. As yet I haven't had an opportunity to get down to New Rochelle to see

Ruth Parkinson and the children, but hope to do so in the spring. With the increased demand for paper board we have been trying to run seven days a week, so I've been pretty busy. It's quite a trick to keep everything running. We (the Prestons) have a barn just outside of town where we keep a few saddle horses. The place has been a big help lately in providing eggs and chickens besides a supply of vegetables." Frank is now plant engineer at the New Haven Pulp and Board Company, and is chairman this year of the New Haven section of the American Society of Mechanical Engineers.

The Alumni Association is apparently going ahead with its Alumni Day plans. It is to be expected that Alumni planning to attend either the Alumni Day exercises or a class reunion or both, will use judgment as to whether traveling a given distance would be advisable for them. The chances are that many will find some way to combine a business trip with attendance at alumni affairs, but that the bulk of the attendance will be by those who live within a couple of hundred miles of Cambridge, as is the case even in normal times. To provide an idea of the number living within a reasonable radius of the Institute, I counted some of the address cards and came up with the following data: a hundred twenty-six graduates and affiliates live within the Greater Boston Postal District, 90 more in the remainder of Massachusetts, and 89 in the other New England states. There are also 79 in metropolitan New York, and 54 in the rest of New York State. The total of the number given is 438. This makes no allowance for those living in New Jersey areas adjacent to New York City. It looks as though we could have a pretty respectable reunion with Alumni from these states alone. — **HOLLIS F. WARE**, General Secretary, P.O. Box 52, Godfrey, Ill. **F. LEROY FOSTER**, Assistant Secretary, Room 5-105, M.I.T., Cambridge 39, Mass.

1926

The Secretary has received the following letter from John G. Fletcher: "Now that I have ceased to be an A.P.O. number, care of Postmaster, New York, and am back in the United States [6605 Strathmore Street, Chevy Chase, Md.], it is high time to give you something for your monthly item in *The Review*. I met several '26 men along the course of my travels in North Africa and in Sicily. Bruce Humphreville, whom I saw a few times, is with the Seventh Army. . . . Henry Sachs '25 and I were together in Sicily for a time.

"I am now with the chemicals bureau of the War Production Board, the Army having decided last summer that the war was about over and there was no need for Chemical Warfare officers, especially those with a little rank. I expect to see a number of people I have not seen for several years when I go to the monthly meetings of the Washington Society of the M.I.T. It has been three years since I have attended one of their affairs; so they should be very interesting. I can tell you it is very nice to be back here again and to see old friends and classmates as well as to hear about this one and that one. I have run into Dick Plummer a number of times.

"I enjoy reading *The Review* very much, and hence I hope you continue to have a bit each month on the various members of our

Class who, I am sure, must be doing a host of important and interesting things."

A very handsome announcement of the firm "Muller-Barringer, Designers," has come to the Secretary, the Muller being our own Theodor Muller, who has made a mark for himself in New York as production and design manager of Dorothy Draper, Inc., and who thus in this new firm comes to the full expression of his professional activity.

The South American contingent seems, at least temporarily, to be back on the home lot. I spoke last month of Bull Roberts' visiting the Institute, and I find that Dick Plummer is now with the Rubber Reserve Company in Washington and that Henry Rickard, who likewise was in Buenos Aires, is in New York. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge 39, Mass.

1927

Joseph H. Gaylord is now living in Cleveland at 17900 Parkmount Avenue. He moved there last August as assistant director for development in Region VIII of the Federal Public Housing Authority. As such, he is responsible for the planning and construction of all public war housing projects in Michigan, Ohio, West Virginia, and Kentucky. Joe formerly held the same post for Region III, which included Delaware, Maryland, the District of Columbia, Virginia, Puerto Rico, and the Virgin Islands. When the war housing program has been completed, Joe says, "we will continue our slum clearance program, Congress being willing."

After many years in Boston, Alf K. Berle moved to Washington, D.C., at the end of last year, leaving the research division of the United Shoe Machinery Corporation. He is now working in Dr. Bush's Office of Scientific Research and Development, and in the particular division called the Office of Field Service, of which Dr. K. T. Compton is the chief. Alf says he is working on "the various phases of development of instrumentalities of war," but he is looking forward to the return of peacetime work. The Berle family is still in Dedham, whither Alf commutes for most of his week ends.

Walter K. Johnson is now assigned to an engineer aviation battalion. The personnel of his battalion is being trained in the construction of airfields for the Army Air Forces. This training is taking place at MacDill Field, Fla., but since Walter entered active duty in July, 1942, he has been stationed at Fort Belvoir, Greenville, S.C., Tampa, and Gulfport. At Belvoir in late 1942, he, Lieutenant Colonel Paul Ivanchich, and Major Reggy Jacobs (now lieutenant colonel) had a 1927 reunion. The present whereabouts of Ivanchich and Jacobs is not known. In Montgomery, on the way back from a visit to his home in Virginia at Christmas, Walter bumped into Henry Newell, whom he hadn't seen since graduation. Reminiscences lasted all the way from Montgomery to Mobile, where each went his separate way. Newell has supervision of a large group of welders in a shipyard at Mobile.

Thomas A. Edison, Inc., has announced that Captain Andrew Anderson of the Army Ordnance Reserve has been released from active duty in the New York district to become manager of engineering for the

special products division of the company. He had been in charge of ammunition manufacture inspection since January, 1942. Prior to that time, Andy had been with Monroe Calculating Machine Company at Orange, N.J., since his graduation. His present address is 112 Montrose Street, Newark, N.J.

We have received word from I. D. Thrasher's office that he is now serving overseas with the United States Naval Reserve. B. A. Gillies is now assistant to the president of Ryan Aeronautical Company at San Diego. Randal G. Dunning is in market development work with Merck and Company, Inc., at Rahway, N.J. Visitors to Akron, Ohio, should look up Jim Chamberlain, in care of the United States Stoneware Company.

Edgewood Arsenal is keeping Abraham Mankowich very busy. Now a major, he has been in the Army since May, 1942, with the Chemical Warfare Service. Due to his civilian experience, he is assigned to production of munitions. — "I finally broke away from that Southern California spell and moved to Northern California to become associated with the National Motor Bearing Company in Redwood City," reports Prentiss I. Cole. In explanation, Bud says that this company is a manufacturer of oil seals and chims, and that he is "with a fine outfit, making a quality product." (Plug.) Bud bumped into Dick Cheney a few weeks ago in Palo Alto.

This year's Alumni Day is now scheduled for Saturday, June 23. — JOSEPH S. HARRIS, *General Secretary*, Shell Oil Company, Inc., 50 West 50th Street, New York, N.Y. DWIGHT C. ARNOLD, *Assistant Secretary*, Stevens-Arnold Company, Inc., 22 Elkins Street, South Boston 27, Mass.

1928

Members of the Class visiting Cambridge recently include Joe Parks, Vice-president of Columbia Machine Works in Brooklyn, Johnny Stack, chief of the compressibility research division of the Langley Memorial Aeronautical Laboratory of the National Advisory Committee for Aeronautics, and Herman C. Jones, owner and operator of Cayuga Pottery Company of Ithaca and consulting engineer on design of tunnel kilns. Joe Parks seems very happy and full of business in this present job. He has teamed up with a partner from the Chambon Corporation, where he formerly worked, and the partnership and company are hitting on all eight.

John Stack came to Boston after a lecture he had given before the Institute of Aeronautical Sciences. A clipping from the *Washington Post*, sent us by Jim Allan, contains the following summary of John's lecture: "Interpretation of a lecture delivered by Research Engineer John Stack before the Institute of the Aeronautical Sciences here . . . indicates the shape and structure of the airplane will have to be changed considerably to achieve a practical speed much beyond 500 miles an hour. The speaker placed no limitation on ultimate speeds but said 'the accuracy of the classical aerodynamical theory decreases as speed increases.' Difficulties with conventional wing shapes at the higher speeds were clearly illustrated by motion pictures of the air flow around miniature airfoils. Mysterious forces which have long plagued

pilots and engineers seeking to surpass the speed of sound were projected on the screen by the intricate Schlieren method of photography. Far from the conventional slipstream once believed to accompany and follow the path of a plane through the air, like the wake of a boat through the water, the pictures showed what Stack called a series of 'shock waves.' He defined the speed of sound, normally 750 miles an hour at sea level, as the 'speed at which compressibility and the shock waves begin.' He illustrated that they may occur at 500 miles an hour at high altitude with air pressure less than at sea level. The pictures showed the shock waves streaking downward and upward from the wing, disrupting lift and control, with flashes like Aurora Borealis disrupting radio communication."

Here's a note regarding Howard Root from his father: "My son has been in the service since September, 1942. At present he is on the staff of a General Hospital with the rank of major and is somewhere in the Pacific."

Congratulations are due Louis O'Malley, who was lately elected secretary of the Boston City Club. We also salute Carl Loeb, Vice-president of Climax Molybdenum Company, who was guest of honor at the annual dinner of the metals and minerals division of the Federation for the Support of Jewish Philanthropic Societies of New York City. His associates paid him tribute for his services to the progress of industry and his years of work for this federation and other charitable causes.

A V-mail note from Huyler Ellison, a lieutenant in the Naval Reserve, hails us from somewhere in France: "Just a line to say hello from France. I am now over here with the Navy at my old job. About a month ago I finished temporary duty with Army Civil Affairs on the Brittany Peninsula. It was a very interesting assignment and gave me an opportunity to do a lot of traveling. That part of the country which is untouched is very beautiful, and the people are friendly. I always did have a little trouble with the language, and now it is worse, but I manage to get along. Had to use a lot of it, too, in Civil Affairs. The girls are beautiful. I had a trip to Paris, and through the Loire Valley, and all over Brittany. It was great, but accomplished in a jeep. That is one contraption that gives you your reward — in the end."

Speaking of '28's luminaries, a most interesting excerpt from the *Philadelphia Inquirer* reports the outstanding work being done by York, Pa., and especially by John Connelly: "Some 12 or 15 years ago a broth of a lad called John Connelly came down from Boston to try his hand at a job in York. He had in his hip pocket his diploma from . . . Technology, and with this passport he immediately went to work. Boston-born Mr. Connelly liked York, and he developed an especial fondness for one of York's girls. And so they were married. No longer an industrialist but the head of a prosperous retail establishment on the main stem, Mr. Connelly is now chairman of a country-wide committee planning for the post-war era. The Boston buck has become such an integral part of the York scene that you can hardly tell him from a Pennsylvania Dutchman. Under his direction, the York Chamber of Commerce and a similar body in Hanover, together

with the Manufacturers' Association, the C.I.O., the A.F.L., civic and fraternal organizations, in fact every agency of any account in York county, have been brought together in a common purpose — to keep this old town in the forefront of industrial centers.

"They call it a 'grass roots' organization, an apt descriptive term. One of the aims of Mr. Connelly and his merry men is to have the whole country industrially surveyed with a view to getting an accurate line on every phase of community life — highways, schools, churches, housing, transportation, parking, recreational facilities, factory space, in fact anything you can mention. At the moment there is some difference of opinion between the city and the county with respect to the cost of the survey. Baker Brothers, an engineering firm of Rochester, Pa., has offered to make the survey for \$25,000, and the City Council has appropriated \$12,500 as its share of the cost, but the county officials have yet to be convinced. Apparently they look longer at a dollar in the country than they do in the city. Mr. Connelly believes that in time the money will be forthcoming and the survey made. Meanwhile, his committee is going ahead with its own plans. It took us two or three hours to catch up with Mr. Connelly, which gives you some idea of the way the lad who was raised on Boston beans is hopping about this industrial-agricultural community."

Ermanno Basilio and his wife announce the birth of their second child, a son named Herman Anthony, at the Strong Memorial Hospital. The Class raises its stein in the young man's honor. — Francis McCabe, a lieutenant in the Corps of Engineers, is now a prisoner of war in Germany, according to word received by his sister. Before his enlistment in 1942, Frank was a metallurgical engineer with the Bell Aircraft Corporation of Buffalo. — GEORGE I. CHATFIELD, *General Secretary*, 6 Alben Street, Winchester, Mass.

1930

The 15-year reunion will consist of an informal gathering in connection with the Alumni Day celebration in Boston in June, with simultaneous meetings of 1930 men in such centers as New York, Washington, Rochester, Akron, or wherever two or more classmates can get together. This decision has been prompted by two factors over which most of us have little if any control: (1) the Office of Defense Transportation restrictions on travel, and (2) the inability of those in uniform or in wartime industries to take sufficient time from their duties to attend a reunion of two or three days. It is felt that the occasion will not pass by unmarked and that the 20-year reunion in 1950 will have an added significance for us.

As you may have surmised, your Secretary has been in touch with Jack Bennett recently. Jack reports the birth of Ted Riehl's second son in December. Ted, Jack, and Jim Holden are still with Goodyear in Akron, while Fluque Rowzee is in charge of a synthetic plant in Sarnia, Ont. — The engagement of Elizabeth Fay of Dorchester to E. Dudley Goodale, VI-A, was recently announced. A new bridegroom is Fred Holt, X, a lieutenant in the Army, who was married in February to Joyce Hunt of

Brookline. — Howie Gardner, X, is at the Institute for six months on leave from his post as head of the chemical engineering department at the University of Rochester. — PARKER H. STARRATT, *General Secretary*, 1 Bradley Park Drive, Hingham, Mass.

1931

News has been rather scarce over the last few months, but here are a few items which your Secretary has run across through personal contacts.

I was in Washington recently and met Johnny Olsen in a corridor in the Navy Building and found that he has been in the Navy for the last eighteen months. John is a lieutenant and is located in Washington apparently for the duration, as he has moved his family down there. — Helge Holst is now at the Radiation Laboratory at M.I.T. on leave from his position with Lever Brothers. Helge was recently out in the Pacific on special work in connection with his Radiation Laboratory job. Ed Hubbard is also at Radiation Laboratory, doing his bit to help along the radar program.

I met Bob Marcus and Mrs. Marcus in Penn Station, N.Y., recently. Bob and his wife were visiting New York from their home in Trenton, N.J., to do a little shopping. They have been living in Trenton for the past six years, having moved there from Brookline, Mass., when Bob's work called for his being permanently located at Trenton.

We were sorry to hear that Gil Roddy had a rather prolonged illness this last winter. Gil is now a colonel in the Army and is located in the First Service Command Headquarters here in Boston. — Elliot F. Childs was married to Helen Wetherbee, daughter of Mrs. Frank W. Wetherbee of Newtonville. Elliot and Mrs. Childs are making their home in Waltham, Mass. — BENJAMIN W. STEVERMAN, *General Secretary*, 11 Orient Street, Winchester, Mass.

1934

It is with the deepest regret that we bring you news of the death of Beshara Battit. He was one of those individuals who was exceptionally well liked by everyone who knew him, and his passing is going to leave a dent in the hearts of a good many members of our Class. We have a letter from Henry Backenstoss which gives the details of the fatal accident and we pass it, on verbatim: "One of the most disheartening occasions that could possibly prompt a letter for the class notes is the immediate cause of my writing you. Our classmate, Beshara Battit, a captain in the Army, was killed in action in France on October 11. I knew him particularly well because we had worked together since 1936 as engineers for Jackson and Moreland. During that time Nim, as he was always called, worked hard, played hard, and made himself one of the old stand-bys in the office both by his personal qualities and by his steadfast work. At school he took the advanced R.O.T.C. training, receiving his second lieutenantcy upon graduation.

"Shortly after war broke out, he was called to duty with the Signal Corps and spent some time at various camps, eventually taking advanced courses in radar at Harvard and Technology. From the latter he was transferred to Wright Field, where

he served as a project engineer. On September 13 of last year he and another officer, a lieutenant, went overseas from Wright Field on a special mission. They worked out of Advanced Base Headquarters in the European theater and, with the great speed that characterizes military missions, had been in such places as London, Paris, and Brussels within a very short time. On October 11, while examining some enemy equipment captured during the Allied advance of the previous summer, Nim, although proceeding with the utmost caution, stepped upon a German S mine and was killed instantly. His companion summoned aid from the near-by town, and among the party which responded one other was also killed by another mine. Had Nim not met with this accident, his mission would have been completed about the 10th of December, and he would have been back at Wright Field and with his family and friends again. In company with many others, the Class will miss Nim greatly. He was very active in organizing the 5th reunion, as those who were present will remember. It is interesting to note that Nim, unexpectedly in New England at the time, chose to spend the week end of our reunion last summer with his family in Cambridge instead of with us: It was the last time they were together."

A letter from Philip Kron, a major stationed at Fort Leavenworth, Kansas, supplied us with a mine of information which I am sure will be much appreciated. Phil's address is 450-10 Kearney Avenue, Fort Leavenworth, Kansas, in case any of you men wish to drop him a line. Here is his letter: "After reading Bob Becker's accounts of his experiences at Anzio and in southern France, I feel that the least I can do is provide a brief note about some of the classmates whom I have run into. We have sure got to build up our column, and I should like to hear and read about the tremendous experiences some of the other boys are having. About a year and a half ago I met Richard Bell, a lieutenant, at San Antonio Air Technical Service Command. He is a captain now. He was doing a swell job in personnel and training, and we had quite a chat about the old days at the Institute. — Harold Thayer is in charge of government sales at the Mallinckrodt Chemical Works in St. Louis, Mo. He has recently become a proud papa. I talked to him on the telephone when I went through St. Louis about four weeks ago, and he is still the same old Harold, sure of himself and his job, and loyal to his organization. — A short time ago my brother met Rex Murdoch at the Bath Iron Works. Rex is a lieutenant in the Navy and is evidently an inspector at the Bath Iron Works. He has one child and is expecting another soon.

"When I was assigned to Headquarters, Air Technical Service Command, and went to Washington frequently, I used to see Major Spike Jewett regularly in the Pentagon Building. During one of these trips he showed me through the message center and it was, indeed, an unbelievable sight. Since I last saw him, he has had an extensive trip to Russia but is now back in the Pentagon Building and undoubtedly continuing to do a tremendous job for the Signal Corps. About five weeks ago, as Buffalo was having its worst snowstorm in history,

I talked to Butch Patch but couldn't see him. He is still with Linde Air Products Company and has two children, one boy and one girl. — Major Gil Lorenz, according to his Christmas card, is still at Wright Field acting as liaison officer between the engineer detachment and the photographic laboratory of the Army Air Forces. He has a new daughter, Julie. Roy Thompson and Dave Babcock '33 are still at the Camera Works of the Eastman Kodak Company. They are both doing highly important production control and design work on Army, Navy, and Air Forces matériel.

"As for myself, I have been battling around the country quite a bit in photographic supply work. I was formerly at the Air Technical Service Command Headquarters at Wright Field, and from there I went to the specialized photographic depot in Denver, Colo., which was lately transferred to Ogden, Utah, where I am now permanently assigned to the Ogden Air Technical Service Command. Presently, however, I am on temporary duty at Fort Leavenworth, Kansas, attending the 22d Command and General Staff School class. This is really an experience. The classes remind me a great deal of Technology and particularly of those freshman lectures by Professor Frank. The experience value, however, is tremendous, and I expect to come out a much more informed Army man. But I look forward to the day when I can return to Rochester and the Eastman Kodak Company."

Major and Mrs. Raymond Jewett announce the birth of a son, Alan Bryce Jewett, who was born on August 29. If any of you fellows want to drop pappy a card, his address is 6251 Branch Avenue, Southeast, Washington, D.C. — John Skinner is planning a trip altarward before long. His engagement to Rita Eileen Fitzgerald, daughter of John H. Fitzgerald of Chelsea, Mass., has been announced. Miss Fitzgerald, who is a music teacher at the Shurtleff Junior High School, was graduated from Salem Teachers College in 1938 with the degree of bachelor of science, and then attended the school of music at Boston University. John is in charge of a technical laboratory in the Massachusetts Division of Occupational Hygiene. — How about a few more of you fellows crashing through with some news that's fit to print? — JOHN G. CALLAN, JR., *General Secretary*, 184 Ames Street, Sharon, Mass. ROBERT C. BECKER, *Assistant Secretary*, 169-49 24th Avenue, Flushing, N.Y.

1940

Sergeant George O. Schneller was among the men in one of the Ranger Battalions that landed in France on D-Day. He was injured and removed to a base hospital in England. Subsequently he recovered sufficiently to escape from the hospital and hitchhike back to France, where he rejoined his regiment. — T. A. Edwards, who is a seaman first class, has been at the Navy Training Station, Wright Junior College, Chicago, and is now at Great Lakes. He has begun his education as a radio and radar technician in a course which will be 10 months long, covering intensively in that time what would normally require two years. This means busy days and evenings, from 5:30 A.M. to 9:30 P.M. At present his work is in mathematics, electricity,

slide rule factors, and laboratory tool practice. He says the pace is fast, but he likes it that way.

Henry B. Richmond of the Class of 1914 reports that he saw N. R. Scott, a captain in the engineer division of the Air Technical Service Command, out at Wright Field. He is the branch officer of the transition and testing branch of the Special Projects Laboratory of the Aircraft Radio Laboratory. This must mean that his office has an Air Technical Service Command code designation of at least eight letters. He has a very important position in that his unit is responsible for putting the ideas that have been developed into manufacturable shape, and for all testing. The Special Projects Laboratory is principally concerned with electronic equipment. — Edith C. Kingsbury, who, with her husband, Edward J. Kingsbury, Jr., is living in Keene, N.H., sends news of James Boulger. Lieutenant Boulger has been navigator on a bomber for about a year in the Pacific. He is back in this country now instructing in the air at Jacksonville, Fla. He manages to fly around to visit such places as Cuba, Yucatan, Nassau, and Mexico.

We are very sorry to report the death of Samuel Breck. He died while on a trip to Middletown, Conn., on September 4, after suffering two severe internal hemorrhages. Details of his death have not appeared in these notes before. He was living at the time in Rutherford, N.J., and working as a research chemist with the United States Rubber Company in Passaic. He is survived by his wife and a daughter, Evelyn Margaret, who was born on May 4, 1944.

News comes of the announcement of the engagement of June Reipe to John J. Casey, Jr. Captain Casey is with the engineer division of the Air Technical Service Command. Announcement of the engagement of Phyllis Swan to Robert T. Dorsey was made early last December, and they were married before the end of the year. Also at the close of last year Barbara Cutting Olsen and William M. Hearon were married. Captain Hearon is assistant professor of chemistry at the Institute. — We have two marriage announcements of note to report. Larry Bernbaum was married to Louisa Joan Frank of Larchmont, N.Y., on February 3. They have made their home in Boston. Larry is working in the Wind Tunnel at Technology. Frank Libman, X-B, married Sophia McBride in December in Arlington, Va. The "at home" address reported is 216 East Main Street, Westminster, Md. It looks close enough to make him a Washington commuter, probably for the duration. — A card with a pink ribbon announced the birth of a daughter, Roberta Ashby, to Lieutenant and Mrs. Benjamin A. Boshier in November. Ben is now far away on an island in the Pacific, caring for the Marine planes. He hopes for a tour of duty on a carrier that will take him up to Japan's front door.

Frank Penn writes as follows to the Class of 1940: "Although it's hard to realize that the time could pass so quickly, our Class is scheduled for its 5-year reunion on Saturday, June 23 (Class and Alumni Day), just a few short weeks away. Tom Creamer and Gary Wright have asked me to fill their shoes in getting the ball rolling, so I'm taking this opportunity to remind

all of you to keep the date open. Details will follow shortly, but meanwhile any suggestions which might contribute to the occasion would certainly be welcomed. Home is 2 Sedgwick Road, Cambridge, so I'll hope to hear from you. Don't forget the date — Saturday, June 23. See you then!" — H. GARRETT WRIGHT, *General Secretary*, 1040 Lombard Street, San Francisco 9, Calif. THOMAS F. CREAMER, *Assistant Secretary*, Apartment 436, 2032 Belmont Road, Northwest, Washington, D.C. JOHN L. DANFORTH, *Acting Assistant Secretary*, Room 24-222, M.I.T., Cambridge, Mass.

1942

The mail bag is pretty full this month, but we certainly aren't getting all the news we should from some of you fellows who are a long way from home. This month we have also managed to collect quite a few clippings, and these clippings bear mute testimony to the taste of all of the fellows in our Class as regards the female of the species. According to the latest reports, Henry Zimmermann and Priscilla Durland have formally declared their intentions. Owen Welles, likewise, has honorable intentions towards Jeanne Seidel, and Norman Pinto, it is announced, is now engaged to Shirley Knight of Arlington. When are all these happy events going to occur? We always get the announcements long after the wedding has occurred.

Ranulf Gras and Annette Peters will soon be taking the fatal step, and one of our far eastern students also is looking forward to the bliss of married life. Luis Lim is engaged to Estafania Aldaba. Roland Danielson now has a "better half," and from the picture she is a much better half. They are planning to set up housekeeping in Cambridge, too. Enough of this news about women.

We find that Ken Leghorn is now a major, no less, working with the Army Transport Command out of India. He holds the Distinguished Flying Cross, the Air Medal, and a Presidential Citation. Too bad we haven't got some of his firsthand stories. Among us few civilians, we find that An Huh Shieh has now transferred to the University of Notre Dame, where he is the new instructor in the department of aeronautical engineering. — Yesterday afternoon while we were waiting for a trolley car, who should walk by but Little Joe Eliot? Of course, he wouldn't say "Hello," but I guess he was traveling, as usual, in a reasonably dense fog. Also we find, much to our astonishment, that Bob Osborne, that fugitive from the T.C.A. office, is still pounding the halls of the Institute.

Who could ever forget Jack Quinn? Well, last month we reported his marriage to Maryan Tague out in Pasadena. Since then we have had a newspaper clipping with the young lady's picture, and all I can say is that Jack never did that well while he was here at Tech; although heaven only knows, he tried hard enough. Carl Meurk is evidently considering matrimony seriously, since his engagement to Jacklyn Fisher has appeared in the newspapers. Likewise Len Drennan and Mary Swift have signified their intentions for the near future. Bob Cunningham has gotten his girl to set a definite date, and Miss Claire Steinhardt will become Mrs. Bob Cunningham early

this summer. Jim Klein and Theodora Wood have announced their engagement, the wedding to take place sometime this spring out in Pasadena. Maybe Jack Quinn could give Jim some tips on this Pasadena wedding business.

Dick Stout, from whom we have heard very little in the last two years, has finally been discovered working for Dewey and Almy, also doing overtime taking care of the latest addition to their family. Now, I ask you, can anyone imagine Dick Stout a father? Steve Stephanou, having spent considerable time canvassing the dorms at Kansas University, finally came out with the right number, and by now Miss Louise Longenecker (Steve claims the name doesn't mean a thing) will be Mrs. Stephanou. Also, it seems that Kansas is "dry," which is causing Steve some little trouble at this point. Tch! Tch!

A long overdue Christmas card has finally found its way back to the States. It was addressed to Fred Baumann, our illustrious secretary, at his home in Illinois. It then followed a rather devious route, stopping off in San Francisco and on Saipan and finally wending its way back to the Alumni Office. It started out in India, at Calcutta to be exact, and wishes everyone a merry Christmas from Max Kaplan, Bob Greenes, Dan Schaeffer, and Charlie Prohaska. I wonder how they ever let Charlie get into India? — Last, but not least, we have a reasonably lengthy communiqué from the one and only Filo Turner. He seems to be in good spirits, and I suspect from his letter that the Navy has been treating him pretty well. He has two stripes now, and I suppose by this time the Admiral finds him absolutely indispensable. He certainly must be indispensable to the

maintenance of the planes aboard his aircraft carrier. — FREDERICK W. BAUMANN, JR., *General Secretary*, Orchard Lane, Golf, Ill. S. YOUNG TYREE, JR., *Assistant Secretary*, Room 2-215, M.I.T., Cambridge 39, Mass.

1943

Sorry, that this must be all for this month, as I am getting married on the day these notes fall due at the Review Office. The cause for my inability to write is Betty Williams of Staten Island, and the scene of my surrender will be St. Thomas', N. Y.

So far as the notes are concerned, next month will be a different story — don't misunderstand that! I mean I shall really write a lot more, and about two or three other people besides myself. — CLINTON C. KEMP, *General Secretary*, Fire Control Section, The Ordnance School, Aberdeen Proving Ground, Md.

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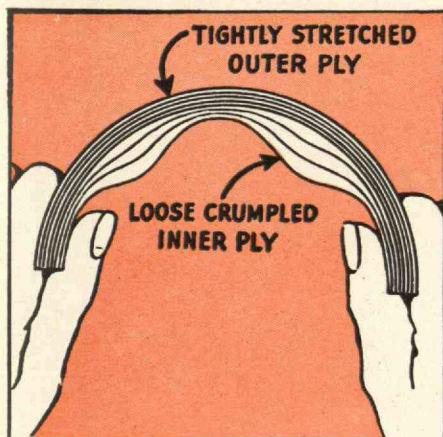
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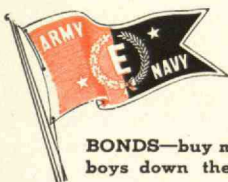
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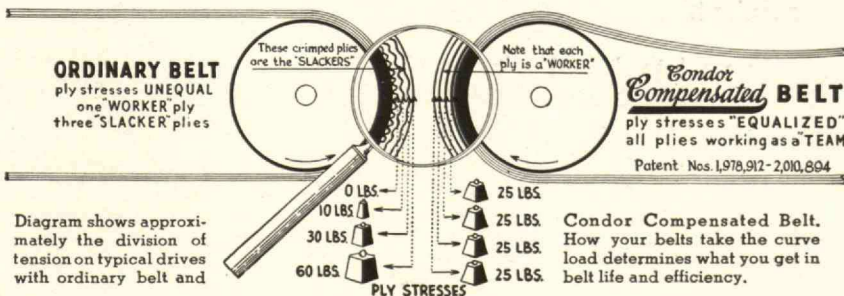
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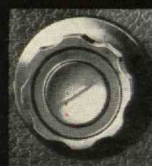
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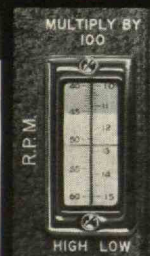
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